

# UTAH

## **PM10 Maintenance Provisions for Salt Lake County**

### Section IX.A.10

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## **Section IX.A.10**

### **PM10 Maintenance Provisions for Salt Lake County**

#### **IX.A.10.a Introduction**

The foregoing Subsections 1-9 of Part IX.A of the Utah State Implementation Plans (SIP) were written in 1991 to address violations of the National Ambient Air Quality Standards (NAAQS) for PM<sub>10</sub> in both Utah County and Salt Lake County. These areas were each classified as Initial Moderate PM<sub>10</sub> Nonattainment Areas, and as such required “nonattainment SIPs” to bring them into compliance with the NAAQS by a statutory attainment date. The control measures adopted as part of those plans have proven successful in that regard, and at the time of this writing (2005) each of these areas has a substantial record of continued compliance with the federal health standards for PM<sub>10</sub>.

This Subsection 10 of Part IX.A of the Utah SIP represents the second chapter of the PM<sub>10</sub> story for Salt Lake County, and demonstrates that the area has achieved compliance with the PM<sub>10</sub> NAAQS and will continue to maintain that standard through the year 2017. As such, it is written in accordance with Section 175A (42 U.S.C. 7505a) of the Act, and should serve to satisfy the requirement of Section 107(d)(3)(E)(iv), should Utah pursue the option of petitioning the EPA to ultimately redesignate Salt Lake County.

This section is hereafter referred to as the “Maintenance Plan” or “the Plan,” and contains the maintenance provisions of the PM<sub>10</sub> SIP for Salt Lake County.

While the Maintenance Plan could be written to replace all that had come before, it is presented herein as an addendum to Subsections 1-9 in the interest of providing the reader with some sense of historical perspective. Subsections 1-9 are retained for historical purposes, while existing subsection 10 (transportation conformity for Utah County) is herein replaced. A more current evaluation of transportation conformity for Utah County is presented in Section IX.A.11.

In a similar way, any references to the Technical Support Document (TSD) in this section means actually Supplement III-05 to the Technical Support Document for the PM<sub>10</sub> SIP.

#### **Background**

The federal Clean Air Act requires areas failing to meet the federal ambient PM<sub>10</sub> standard to develop SIP revisions with sufficient control requirements to expeditiously attain and maintain the standard. On July 1, 1987, EPA promulgated a new NAAQS for particulate matter with a diameter of 10 microns or less (PM<sub>10</sub>), and listed Salt Lake County as a Group I area for PM<sub>10</sub>. This designation was based on historical data for the previous standard, total suspended particulate, and meant that there was a 95% probability that Group I areas would exceed the new PM<sub>10</sub> standard. Group I area SIPs were due in April 1988, but Utah was unable to complete the SIP by that date. In 1989, several citizens groups sued EPA (*Preservation Counsel v. Reilly*, civil Action (No. 89-C262-G (D, Utah)) for failure to implement a Federal Implementation Plan (FIP) under provisions of §110(c)(1) of the Clean Air Act (42 U.S.C. 7410(c)(1)). A settlement agreement in January 1990 called for Utah to submit a SIP and for EPA to approve it by December 31, 1991. In August 1991, the parties voluntarily agreed to dismiss the lawsuit and the complaint and vacate the settlement agreement.

The Clean Air Act Amendments of November 1990 redesignated Group I areas as initial moderate nonattainment areas and required submittal by November 15, 1991, of a SIP requiring installation of Reasonably Available Control Measures (RACM) on industrial sources affecting the nonattainment areas by December 10, 1993. It required that states demonstrate attainment of the standard not later than December 31, 1994.

### **(1) The PM<sub>10</sub> SIP**

On November 14, 1991, Utah submitted a SIP for Salt Lake and Utah Counties that demonstrated attainment of the PM<sub>10</sub> standards in Salt Lake and Utah Counties for 10 years, 1993 through 2003. EPA published approval of the SIP on July 8, 1994 (59 FR 35036).

### **(2) Supplemental History of SIP Approval - PM<sub>10</sub>**

Utah's SIP included two provisions that promised additional action by the state: 1) a road salting and sanding program, and 2) a diesel vehicle emissions inspection and maintenance program.

On February 3, 1995, Utah submitted amendments to the SIP to specify the details of the road salting and sanding program promised as a control measure. EPA published approval of the road salting and sanding provisions on December 6, 1999 (64 FR 68031).

On February 6, 1996, Utah submitted to EPA a new SIP Section XXI, a diesel vehicle inspection and maintenance program. EPA has not acted on that submittal.

Also, in April 1992, EPA published the "General Preamble," describing EPA's views on reviewing state SIP submittals. One of the requirements was that moderate nonattainment area states must submit contingency plans by November 15, 1993.

On July 31, 1994, Utah submitted an amendment to the PM<sub>10</sub> SIP that required lowering the threshold for calling no-burn days as a contingency measure for Salt Lake, Davis and Utah Counties.

On July 18, 1997, EPA promulgated a new form of the PM<sub>10</sub> standard. As a way to simplify EPA's process of revoking the old PM<sub>10</sub> standard, EPA requested on April 6, 1998, that Utah withdraw its submittals of contingency measures. Utah submitted a letter requesting withdrawal on November 9, 1998, and EPA returned the submittals on January 29, 1999.

### **(3) Attainment of the PM<sub>10</sub> Standard and Reasonable Further Progress**

By statute, Initial Moderate Areas had to show they were attaining the standard by December 31, 1994. This showing required examining the last three years of monitoring data (in this case 1992, 1993 and 1994). The 24-hour NAAQS allows no more than three expected exceedances of the 24-hour standard at any monitor in this 3-year period. Since the statutory deadline for the implementation of RACM was not until the end of 1993, it was reasonable to presume that the area might not be able to show attainment with a 3-year data set until the end of 1996 even if the control measures were having the desired effect. For this reason, the Clean Air Act §188(d), (42 U.S.C. 7513(d)) allows a state to request up to two 1-year extensions of the attainment date. In doing so, the state must show that it has met all requirements of the SIP, that no more than one exceedance of the 24-hour PM<sub>10</sub> NAAQS has been observed in the year prior to the request, and that the annual mean concentration for such year is less than or equal to the annual standard.

1 EPA's Office of Air Quality Planning and Standards issued a guidance memorandum concerning  
2 extension requests (November 14, 1994), clarifying that the authority delegated to the  
3 Administrator to extend attainment dates for moderate areas is discretionary. In exercising this  
4 discretionary authority, it says, EPA will examine the air quality planning progress made in the  
5 area, and in addition to the two criteria specified in Section 188(d), EPA will be disinclined to  
6 grant an attainment date extension unless a state has, in substantial part, addressed its moderate  
7 PM<sub>10</sub> planning obligations for the area. The EPA will expect the State to have adopted and  
8 substantially implemented control measures submitted to address the requirement for  
9 implementing RACM/RACT in the moderate nonattainment area, as this was the central control  
10 requirement applicable to such areas. Furthermore it said, "EPA believes this request is  
11 appropriate, as it provides a reliable indication that any improvement in air quality evidenced by a  
12 low number of exceedances reflects the application of permanent steps to improve the air quality  
13 in the region, rather than temporary economic or meteorological changes." As part of this  
14 showing, EPA expected the State to demonstrate that the PM<sub>10</sub> nonattainment area has made  
15 emission reductions amounting to reasonable further progress (RFP) toward attainment of the  
16 NAAQS, as defined in Section 171(1) of the Act.

17  
18 On May 11, 1995, Utah requested one-year extensions of the attainment date for both Salt Lake  
19 and Utah Counties. On October 18, 1995, EPA sent a letter granting the requests for extensions,  
20 and on January 25, 1996, sent a letter indicating that EPA would publish a rulemaking action on  
21 the extension requests. However, no rulemaking was published, nor was a notice published that  
22 the areas had not reached attainment by December 31, 1994.

23  
24 Along with the extension requests in 1995, Utah submitted a milestone report as required under  
25 CAA §172(1), (42 U.S.C. 7501(1)) to assess progress toward attainment. This milestone report  
26 addressed two issues: 1) that all control measures in the approved plan had been implemented,  
27 and 2) that reasonable further progress (RFP) had been made toward attainment of the standard in  
28 terms of reducing emissions. As defined in Section 171(1), RFP means such annual incremental  
29 reductions in emissions of the relevant air pollutant as are required to ensure attainment of the  
30 applicable NAAQS by the applicable date.

31  
32 On June 18, 2001, EPA published notice in the Federal Register (66 FR 32752) that Utah's  
33 extension requests were granted, that Salt Lake County attained the PM<sub>10</sub> standard by December  
34 31, 1995, and that Utah County attained the standard by December 31, 1996. The notice stated  
35 that these areas remain moderate nonattainment areas and are not subject to the additional  
36 requirements of serious nonattainment areas.

## 38 **IX.A.10.b Pre-requisites to Area Redesignation**

39  
40 The Clean Air Act §107(d)(3)(E) outlines five requirements that must be satisfied in order that a  
41 state may petition the Administrator to redesignate a nonattainment area back to attainment.  
42 These requirements are summarized as follows: 1) the Administrator determines that the area has  
43 attained the applicable NAAQS, 2) the Administrator has fully approved the applicable  
44 implementation plan for the area under §110(k), 3) the Administrator determines that the  
45 improvement in air quality is due to permanent and enforceable reductions in emissions resulting  
46 from implementation of the applicable implementation plan ... and other permanent and  
47 enforceable reductions, 4) the Administrator has fully approved a maintenance plan for the area  
48 as meeting the requirements of §175A, and 5) the State containing such area has met all  
49 requirements applicable to the area under §110 and Part D.

Each of these requirements will be addressed below. Certainly, the central element from this list is the maintenance plan found at Subsection IX.A.10.c below. Section 175A of the Act contains the necessary requirements of a maintenance plan, and EPA policy based on the Act requires additional elements in order that such plan be federally approvable. Table IX.A.29 identifies the prerequisites that must be fulfilled before a nonattainment area may be redesignated to attainment under Section 107(d)(3)(E).

<b>Table IX.A.29 Prerequisites to Redesignation</b>			
<b>Category</b>	<b>Requirement</b>	<b>Reference</b>	<b>Addressed in Section</b>
Attainment of Standard	Three consecutive years of PM <sub>10</sub> monitoring data must show that violations of the standard are no longer occurring.	CAA §107(d)(3)(E)(i)	IX.A.10.b(1)
Approved State Implementation Plan	The SIP for the area must be fully approved.	CAA §107(d)(3)(E)(ii)	IX.A.10.b(2)
Permanent and Enforceable Emissions Reductions	The State must be able to reasonably attribute the improvement in air quality to emission reductions that are permanent and enforceable	CAA §107(d)(3)(E)(iii), Calcagni memo (Sect 3, para 2)	IX.A.10.b(3)
Section 110 and Part D requirements	The State must verify that the area has met all requirements applicable to the area under section 110 and Part D.	CAA: §107(d)(3)(E)(v), §110(a)(2), Sec 171	IX.A.10.b(4)
Maintenance Plan	The Administrator has fully approved the Maintenance Plan for the area as meeting the requirements of CAA §175A	CAA: §107(d)(3)(E)(iv)	IX.A.10.b(5) and IX.A.10.c

### **(1) The Area Has Attained the PM<sub>10</sub> NAAQS**

CAA 107(d)(3)(E)(i) - *The Administrator determines that the area has attained the national ambient air quality standard.* To satisfy this requirement, the State must show that the area is attaining the applicable NAAQS. According to EPA's guidance concerning area redesignations (Procedures for Processing Requests to Redesignate Areas to Attainment, John Calcagni to Regional Air Directors, September 4, 1992 [or, Calcagni]), there are generally two components involved in making this demonstration. The first relies upon ambient air quality data which should be representative of the area of highest concentration and should be collected and quality assured in accordance with 40 CFR 58. The second component relies upon supplemental air quality modeling. Each will be discussed in turn.

#### **(a) Ambient Air Quality Data (Monitoring)**

In 1987 EPA promulgated the National Ambient Air Quality Standard (NAAQS) for PM<sub>10</sub>. The NAAQS for PM<sub>10</sub> is listed in 40 CFR 50.6 along with the criteria for attaining the standard. The 24-hour NAAQS is 150 micrograms per cubic meter (ug/m<sup>3</sup>) for a 24-hour period, measured from midnight to midnight. The 24-hour standard is attained when the expected number of days per calendar year with a 24-hour average concentration above 150 ug/m<sup>3</sup>, as determined in accordance with Appendix K to that part, is equal to or less than one. In other words, each monitoring site is allowed up to three expected exceedances of the 24-hour standard within a

1 period of three calendar years. More than three expected exceedances in that three-year period is  
2 a violation of the NAAQS. There is also an annual standard of  $50 \text{ ug/m}^3$ . The annual standard is  
3 attained if the three-year average of individual annual averages is less than  $50 \text{ ug/m}^3$ . Three  
4 consecutive years of  $\text{PM}_{10}$  monitoring data must show that violations of the 24-hour and annual  
5 standard are no longer occurring in order for an area to be considered to be attaining the NAAQS.

6  
7 40 CFR 58 Appendix K, Interpretation of the National Ambient Air Quality Standards for  
8 Particulate Matter, acknowledges the uncertainty inherent in measuring ambient  $\text{PM}_{10}$   
9 concentrations by specifying that an *observed exceedance* of the ( $150 \text{ ug/m}^3$ ) 24-hour health  
10 standard means a daily value that is above the level of the 24-hour standard after rounding to the  
11 nearest  $10 \text{ ug/m}^3$  (e.g., values ending in 5 or greater are to be rounded up).

12  
13 The term *expected exceedance* accounts for the possibility of missing data. Missing data can  
14 occur when a monitor is being repaired, calibrated, or is malfunctioning, leaving a time gap in the  
15 monitored readings. EPA discounts these gaps if the highest recorded  $\text{PM}_{10}$  reading at the  
16 affected monitor on the day before or after the gap is not more than 75 percent of the standard,  
17 and no measured exceedance has occurred during the year.

18  
19 Expected exceedances are calculated from the Aerometric Information and Retrieval System  
20 (AIRS) data base according to procedures contained in 40 CFR Part 50, Appendix K. The State  
21 relied on the expected exceedance values contained in the AIRS Quick Look Report (AMP 450)  
22 to determine if a violation of the standard had occurred. In compiling the data to be evaluated  
23 herein, any data which had been flagged by DAQ and which had not yet been concurred with by  
24 EPA was not considered. Data is flagged when circumstances indicate that it would represent an  
25 outlier in the data set and not be indicative of the entire airshed or the efforts to reasonably  
26 mitigate air pollution within. Appendix N to Part 50 – “Interpretation of the National Ambient  
27 Air Quality Standards for Particulate Matter” anticipates this and states: “Data resulting from  
28 uncontrollable or natural events, for example structural fires or high winds, may require special  
29 consideration. In some cases, it may be appropriate to exclude these data because they could  
30 result in inappropriate values to compare with the levels of the PM standards.” The protocol for  
31 data handling dictates that flagging is initiated by the state or local agency, and then the EPA  
32 either concurs or indicates that it has not concurred. When data is flagged, it is generally not used  
33 for planning purposes because it is not indicative of either the assumptions upon which airshed  
34 management decisions are made or the ultimate effects of those decisions. Nevertheless, some  
35 discussion will be provided that indicates what the ramifications of this data would be if it were to  
36 have been included.

37  
38 Using this criteria, data was compiled for all  $\text{PM}_{10}$  monitors within the Salt Lake County  
39 nonattainment area that recorded a three-year data set comprising the years 2002, 2003 and 2004.  
40 For each monitor, the number of expected exceedances is reported for each year, and then the  
41 average number of expected exceedances is reported for the three-year period. If this average  
42 number of expected exceedances is less than or equal to 1.0, then that particular monitor is said to  
43 be in compliance with the 24-hour standard for  $\text{PM}_{10}$ . In order for an area to be in compliance  
44 with the NAAQS, every monitor within that area must be in compliance.

45  
46 In a similar way, the annual arithmetic mean concentrations of  $\text{PM}_{10}$  are reported for each year,  
47 and then averaged to produce the result that is compared with the annual  $\text{PM}_{10}$  standard of  $50$   
48  $\text{ug/m}^3$ .

49  
50 As illustrated in the table below, the results of this exercise show that the Salt Lake County  $\text{PM}_{10}$   
51 nonattainment area is presently attaining the NAAQS.



**Table IX.A.30 PM<sub>10</sub> Compliance in Salt Lake County, 2002-2004**

Cottonwood 49-035-0003	<b>24-hour Standard</b>	<b>Annual Standard</b>
	No. Expected Exceedences	Annual Arithmetic Mean
2002	0.0	31.9
2003	0.0	28.3
2004	0.0	31.5
3-Year Average	<b>0.0</b>	<b>30.6</b>

North Salt Lake 49-035-0012	<b>24-hr Standard</b>	<b>Annual Standard</b>
	No. Expected Exceedences	Annual Arithmetic Mean
2002	0.0	41.4
2003	0 / 3.1*	37.6 / 39.7*
2004	0 / 1.0*	41.7 / 42.1*
3-Year Average	0 / 1.4*	40.2 / 41.1*

Magna 49-035-1001	<b>24-hr Standard</b>	<b>Annual Standard</b>
	No. Expected Exceedences	Annual Arithmetic Mean
2002	0.0	25.0
2003	0 / 3.1*	22.7 / 26.2*
2004	0.0	23.9
3-Year Average	0 / 1.0*	23.9 / 25.0*

Hawthorne 49-035-3006	<b>24-hr Standard</b>	<b>Annual Standard</b>
	No. Expected Exceedences	Annual Arithmetic Mean
2002	0.0	28.9
2003	0 / 2.1*	25.9 / 27.7*
2004	0.0	29.4
3-Year Average	0 / 0.7*	28.1 / 28.7*

\* The second set of numbers shows what would be the effect of including all of the data that has been flagged by DAQ and not yet concurred with by EPA.

Additional information presented in Subsection IX.A10.b(3) shows that the Salt Lake County PM<sub>10</sub> nonattainment area has not violated the 24-hour standard since 1992, nor has it exceeded the annual standard since 1993. It actually attained both standards as of December 31, 1995, and has remained in compliance with the PM<sub>10</sub> NAAQS through 2004.

At the Cottonwood monitor: there were no such data points, and so there would be no difference.

At the North Salt Lake monitor: there were three days in 2003 (169 ug/m<sup>3</sup> on Feb. 1, 358 ug/m<sup>3</sup> on April 1, and 209 ug/m<sup>3</sup> on April 2) and another day in 2004 (189 ug/m<sup>3</sup> on May 10) that were all flagged by DAQ because of high winds. In each case, the Salt Lake Valley experienced a very dusty wind event due to a dry frontal passage, and elevated concentrations were observed and flagged at other monitor locations. Each of these events has been included in the proposed Natural Events Action Plan (NEAP) as typifying the circumstances under which it would be

appropriate to attach a flag to the data. DAQ expects that the EPA will concur with the flags when it approves the NEAP. Such concurrence would indicate that, despite regional control measures and mitigative action to address fugitive dust, the wind-speeds were such that it would be unreasonable to expect that high concentrations of blowing dust could have been prevented.

At the Magna monitor: there was one day in 2003 (421 ug/m<sup>3</sup> on April 1) that was flagged by DAQ because of high winds. On this day, the Wasatch Front experienced a very dusty wind event due to a dry frontal passage, and elevated concentrations were observed and flagged at other monitor locations. This event has been included in the proposed Natural Events Action Plan (NEAP) as typifying the circumstances under which it would be appropriate to attach a flag to the data. DAQ expects that the EPA will concur with the flag when it approves the NEAP. Even if EPA does not concur with the flag at Magna, the 3-year average of expected exceedances there would not exceed 1.0, and the 3-year average of annual arithmetic mean concentrations would be less than 50. Therefore, the overall conclusion at Magna would remain the same.

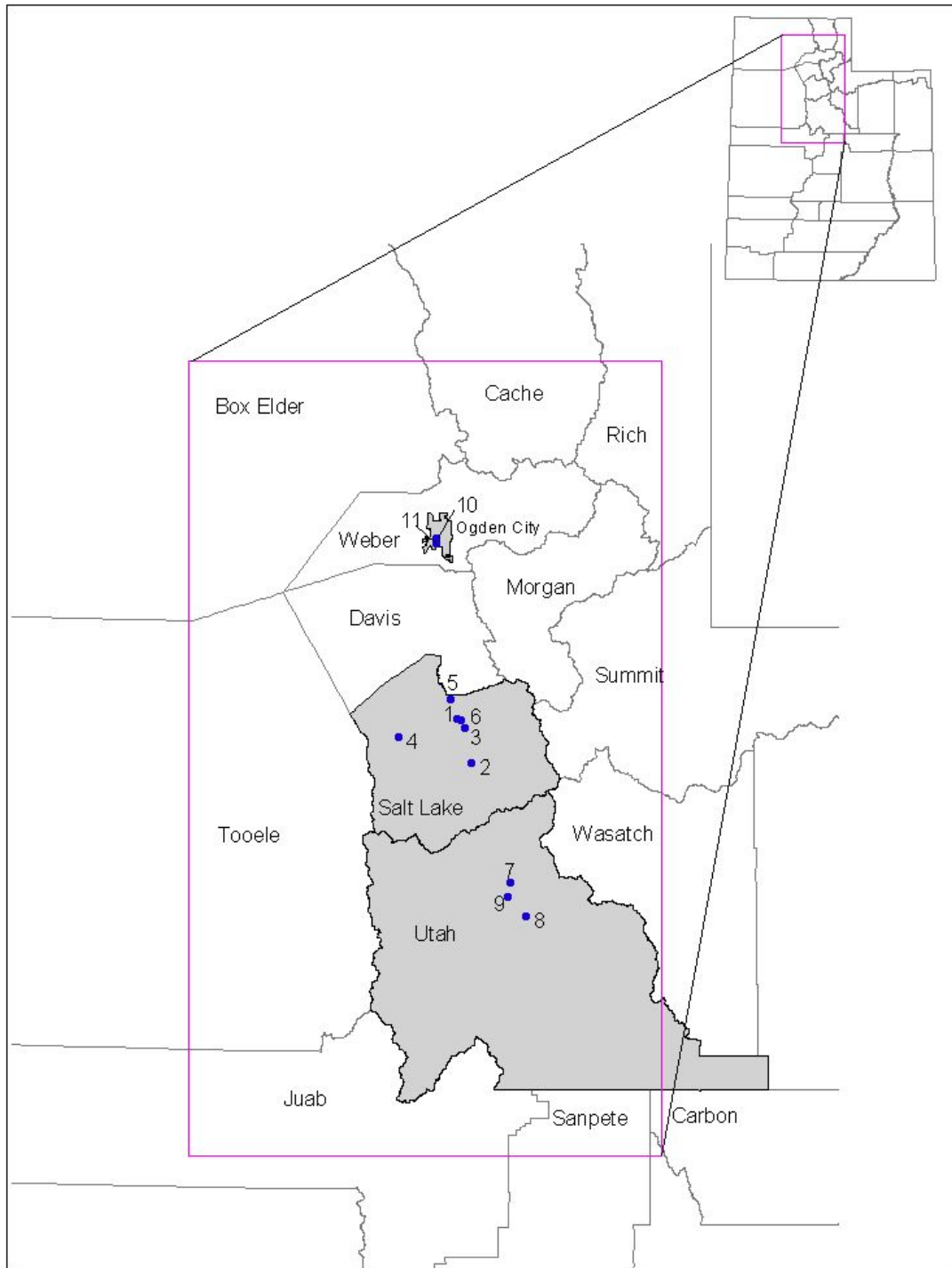
At the Hawthorne monitor: there were two days in 2003 (162 ug/m<sup>3</sup> on Feb. 1, and 360 ug/m<sup>3</sup> on April 1) that were flagged by DAQ because of high winds. In both cases, the Salt Lake Valley experienced a very dusty wind event due to a dry frontal passage, and elevated concentrations were observed and flagged at other monitor locations. Both of these events have been included in the proposed Natural Events Action Plan (NEAP) as typifying the circumstances under which it would be appropriate to attach a flag to the data. DAQ expects that the EPA will concur with the flags when it approves the NEAP. Even if EPA does not concur with the flag at Hawthorne, the 3-year average of expected exceedances there would still be less than 1.0, and the 3-year average of annual arithmetic mean concentrations would be less than 50. Therefore, the overall conclusion at Hawthorne would remain the same.

#### **(b) PM<sub>10</sub> Monitoring Network**

The overall assessments made in the preceding paragraph were based on data collected at monitoring stations located throughout the nonattainment area. The Utah DAQ maintains a network of PM<sub>10</sub> monitoring stations in accordance with 40 CFR 58. These stations are referred to as SLAMS sites, meaning that they are State and Local Air Monitoring Stations. In consultation with EPA, an Annual Monitoring Network Review is developed to address the adequacy of the monitoring network for all criteria pollutants. Within the network, individual stations may be situated so as to monitor large sources of PM<sub>10</sub>, capture the highest concentrations in the area, represent residential areas, or assess regional concentrations of PM<sub>10</sub>. Collectively, these monitors make up Utah's PM<sub>10</sub> monitoring network. The following paragraphs describe the network in each of Utah's three nonattainment areas for PM<sub>10</sub>.

Provided in Figure IX.A.23 is a map of the modeling domain that shows the existing PM<sub>10</sub> nonattainment areas and the locations of the monitors therein. Some of the monitors at these locations are no longer operational, but they have been included for informational purposes.

1 **Figure IX.A.23 Modeling Domain**



2  
3 The following PM<sub>10</sub> monitoring stations operated in the Salt Lake County PM<sub>10</sub> nonattainment  
4 area from 1985 through 2004. They are numbered as they appear on the map:  
5

- 6 1. Air Monitoring Center (AMC) (AIRS number 49-035-0010): This site was located in an  
7 urban city center, near an area of high vehicle use. It was closed in 1999 when DAQ lost  
8 its lease on the building.  
9

2. Cottonwood (AIRS number 49-035-0003): This site is located in a suburban residential area. It has been collecting data since 1986.
3. Hawthorne (AIRS number 49-035-3006): This site is located in a suburban residential area. It began collecting data in 1997.
4. Magna (AIRS number 49-035-1001): This site is located in a suburban residential area. It is largely impacted (at times) by blowing dust from a large tailings impoundment, and as such is anomalous with respect to the typical wintertime scenario that otherwise characterizes the nonattainment area. It has been collecting data since 1987.
5. North Salt Lake (AIRS number 49-035-0012): This site is located in an industrial area that is impacted by sand and gravel operations, freeway traffic, and several refineries. It is situated near a residential area as well. It has been collecting data since 1985.
6. Salt Lake City (AIRS number 49-035-3001): This site was situated in an urban city center. It was discontinued in 1994 because of modifications that were made to the air conditioning on the roof-top.

The following PM<sub>10</sub> monitoring stations operated in the Utah County PM<sub>10</sub> nonattainment area from 1985 through 2004. They are numbered as they appear on the map:

7. Lindon (AIRS number 49-049-4001): This site is designed to measure population exposure to PM<sub>10</sub>. It is located in a suburban residential area affected by both industrial and vehicle emissions. PM<sub>10</sub> has been measured at this site since 1985, and the readings taken here have consistently been the highest in Utah County. Area source emissions, primarily wood smoke, also affects the site.
8. North Provo (AIRS number 49-049-0002): This is a neighborhood site in a mixed residential-commercial area in Provo, Utah. It began collecting data in 1986.
9. West Orem (AIRS number 49-049-5001): This site is located in a residential area adjacent to a large steel mill. It is a neighborhood site. It was situated based on computer modeling, and has historically reported high PM<sub>10</sub> values, but not consistently as high as those observed at the Lindon site. The site was closed at the end of 1997 for this reason.

The following PM<sub>10</sub> monitoring stations operated in the Ogden City PM<sub>10</sub> nonattainment area from 1986 through 2004. They are numbered as they appear on the map:

10. Ogden 1 (AIRS number 49-057-0001): This site was situated in an urban city center. It was discontinued in 2000 because DAQ lost its lease on the building.
11. Ogden 2 (AIRS number 49-057-0002): This site began collecting data in 2001, as a replacement for the Ogden 1 location. It too is situated in an urban city center.

**(c) Modeling Element**

EPA guidance concerning redesignation requests and maintenance plans (Calcagni) discusses the requirement that the area has attained the standard, and notes that air quality modeling may be necessary to determine the representativeness of the monitored data.

Information concerning PM<sub>10</sub> monitoring in Utah is included in the Annual Monitoring Network Review. Since the early 1980's, the network review has been updated annually and submitted to EPA for approval. EPA has concurred with the annual network reviews and agreed that the network is adequate. EPA personnel have also visited the monitor sites on several occasions to verify compliance with federal siting requirements.

1 The Calcagni memo goes on to say that areas that were designated nonattainment based on  
2 modeling will generally not be redesignated to attainment unless an acceptable modeling analysis  
3 indicates attainment.

4  
5 Though none of Utah's three PM<sub>10</sub> nonattainment areas was designated based on modeling, it is  
6 still worth pointing out that an air quality modeling analysis was conducted for the purpose of this  
7 maintenance demonstration. It shows that all three nonattainment areas are presently in  
8 compliance, and will continue to comply with the PM<sub>10</sub> NAAQS through the year 2017.

9  
10 **(d) EPA Acknowledgement**

11  
12 The data presented in the preceding paragraphs shows quite clearly that the Salt Lake County  
13 PM<sub>10</sub> nonattainment area has attained the NAAQS. As discussed before, the EPA acknowledged  
14 as much in the Federal Register for both Utah County and Salt Lake County.

15  
16 On June 18, 2001, EPA published notice in the Federal Register (66 FR 32752) that Utah's  
17 extension requests were granted, [and] that Salt Lake County attained the PM<sub>10</sub> standard by  
18 December 31, 1995. The notice stated that the area remains a moderate nonattainment areas and  
19 is not subject to the additional requirements of serious nonattainment areas.

20  
21 **(2) Fully Approved Attainment Plan for PM<sub>10</sub>**

22 CAA 107(d)(3)(E)(ii) - *The Administrator has fully approved the applicable implementation plan*  
23 *for the area under section 110(k).*

24 On November 14, 1991, Utah submitted a SIP for Salt Lake and Utah Counties that demonstrated  
25 attainment for Salt Lake and Utah Counties for 10 years, 1993 through 2003. EPA published  
26 approval of the SIP on July 8, 1994 (59 FR 35036).

27 **(3) Improvements in Air Quality Due to Reductions in Emissions**

28  
29 CAA 107(d)(3)(E)(iii) - *The Administrator determines that the improvement in air quality is due*  
30 *to permanent and enforceable reductions in emissions resulting from implementation of the*  
31 *applicable implementation plan and applicable Federal air pollutant control regulations and*  
32 *other permanent and enforceable reductions.* Speaking further on the issue, EPA guidance  
33 (Calcagni) reads that the State must be able to reasonably attribute the improvement in air quality  
34 to emission reductions which are permanent and enforceable. In the following sections, both the  
35 improvement in air quality and the emission reductions themselves will be discussed.

36  
37 **(a) Improvement in Air Quality**

38  
39 The improvement in air quality with respect to PM<sub>10</sub> can be shown in a number of ways.  
40 Improvement, in this case, is relative to the various control strategies that affected the airshed.

41  
42 For the Salt Lake County nonattainment area, these control measures were implemented as the  
43 result of the nonattainment PM<sub>10</sub> SIP promulgated in 1991. As discussed below, the actual  
44 implementation of the control strategies required therein first exhibits itself in the observable data  
45 in 1994. The ambient air quality data presented below includes values prior to 1994 in order to  
46 give a representation of the air quality prior to the application of any control measures. It then  
47 includes data collected from then until the present time to illustrate the effect of these controls. In  
48 considering the data presented below, it is important to keep this distinction in mind: data through

1993 represents pre-SIP conditions, and data collected from 1994 through the present represents post-SIP conditions.

Referring back to the discussion of the PM<sub>10</sub> NAAQS in Subsection IX.A.10.b(1), it is apparent that the number of expected exceedances of the 24-hour standard is an important indicator. As such, this information has been tabulated for each of the monitors located in each of the nonattainment areas. The data in Table IX.A.31 below reveals a marked decline in the number of these expected exceedances. This decline is especially revealing in light of the significant growth experienced during this same period in time.

Also indicative of improvement in air quality with respect to the 24-hour standard, is the magnitude of the excessive concentrations that are observed. This is illustrated in Figures IX.A.24-27, which show the three highest 24-hour concentrations observed in a particular year. Again there is a noticeable improvement in the magnitude of these concentrations. It must be kept in mind, however, that some of these concentrations may have resulted from windblown dust events that occur outside of the typical scenario of wintertime air stagnation. As such, any control measures directed at the precursors to PM<sub>10</sub> would not be evident.

In considering the annual PM<sub>10</sub> standard, the value of the annual arithmetic mean is clearly the most significant parameter to consider. Annual arithmetic means have been plotted in Figures IX.A.28-31.

The annual data reveals a noticeable decline in the values of these annual means. This is especially significant in light of one of the assumptions made in the original nonattainment SIP for Salt Lake County. Based on EPA guidance which states that “The SIP related emission limits should be based on the NAAQS (annual or 24-hour) which result in the most stringent control requirements” the attainment SIP was developed to address the 24-hour standard for PM<sub>10</sub>. It was assumed then, that by controlling for the wintertime 24-hour standard, the annual arithmetic mean concentrations would also be reduced such that the annual standard would be protected. The data collected between then and now supports the validity of that assumption.

As discussed before in section IX.A.10.b(1), any data which had been flagged by DAQ and which had not yet been concurred with by EPA was not considered for the purpose of this discussion. Data is flagged when circumstances indicate that it would represent an outlier in the data set and not be indicative of the entire airshed or the efforts to reasonably mitigate air pollution within. Nevertheless, some discussion will be provided that indicates what the ramifications of this data would be if it were to have been included in the discussion concerning improvements in air quality due to permanent and enforceable reductions in emissions.

As illustrated in Table IX.A.31 below, the results of this exercise show that the Salt Lake County PM<sub>10</sub> nonattainment area has experienced significant improvements in air quality with respect to PM<sub>10</sub>. The gray cells indicate that the monitor was not in operation.

**Table IX.A.31 Salt Lake County Expected Exceedances per Year, 1985-2004**

Monitors	AMC	Salt Lake	Hawthorne	Magna	N. Salt Lake	Cottonwood
1985					0	
1986		0			6.5	0
1987		0		2.4	0	0
1988		4.6 / 6.7*		2.2	5.8	0
1989	8.7	6.9		0	3.3	0
1990	0	0		0	0	0
1991	15.9	11		0	13.5	8.4
1992	8.6	6.6		0	2.1	0
1993	0	0		0	0	0
1994	1	0		0	0 / 8.6*	0
1995	0			0	0	0
1996	0			0	2.3	0
1997	0		0	0	0	0
1998	0		0	0	0	0
1999	0		0	0	0	0
2000			0	0	0	0
2001			0	0 / 6.4*	0	0
2002			0	0	0	0
2003			0 / 2.1*	0 / 3.1*	0 / 3.1*	0
2004			0	0	0 / 1.0*	0

\* The second set of numbers shows what would be the effect of including all of the data that has been flagged by DAQ and not yet concurred with by EPA.

As discussed before such data is not necessarily considered representative of airshed management, and as such two things should be noted: 1) The focus of the control strategy developed for the 1991 PM<sub>10</sub> SIP was directed at episodes characterized by wintertime temperature inversions, elevated concentrations of secondary aerosol, and low wind speed. Under these conditions, blowing dust is nonexistent. Therefore, in evaluating the effectiveness of these types of controls, the inclusion of several high wind events may mislead the reader. 2) Even if these events are included in the table, the conclusion remains essentially the same; that since 1994 when the 1991 SIP controls were fully implemented, there has been a marked improvement in monitored air quality.

The data that has been flagged by DAQ, and has not yet been concurred with by EPA includes the following:

At the AMC monitor: there were no such data points.

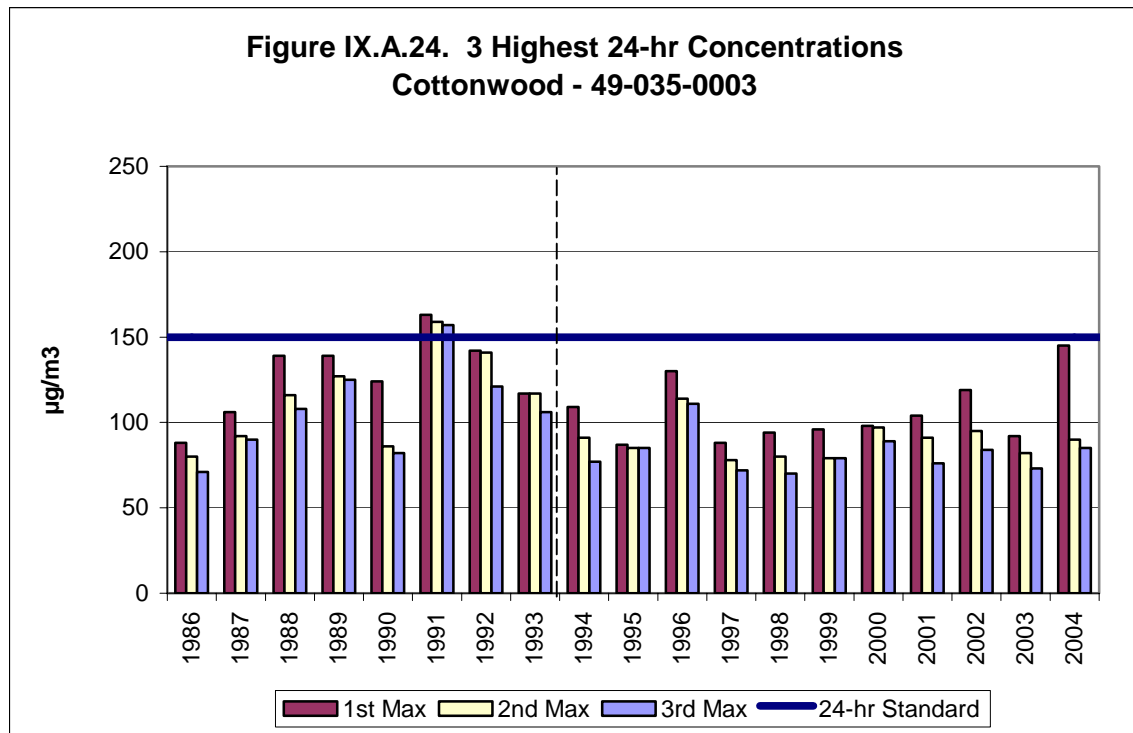
At the Salt Lake City monitor: there was one day in 1988 (205 ug/m<sup>3</sup> on Sept.10) that was flagged by DAQ because of a local construction project.

At the Hawthorne monitor: there were two days in 2003 (162 ug/m<sup>3</sup> on Feb. 1, and 360 ug/m<sup>3</sup> on April 1) that were flagged by DAQ because of high winds.

At the Magna monitor: there were two days in 2001 (201 ug/m<sup>3</sup> on March 14, and 156 ug/m<sup>3</sup> on April 22), and one day in 2003 (421 ug/m<sup>3</sup> on April 1) that were all flagged by DAQ because of high winds.

At the North Salt Lake monitor: there were eight days in 1994 (between June and August) that were flagged because of a local construction project. There were also three days in 2003 (169 ug/m<sup>3</sup> on Feb. 1, 358 ug/m<sup>3</sup> on April 1, and 209 ug/m<sup>3</sup> on April 2), and another day in 2004 (189 ug/m<sup>3</sup> on May 10) that were all flagged by DAQ because of high winds.

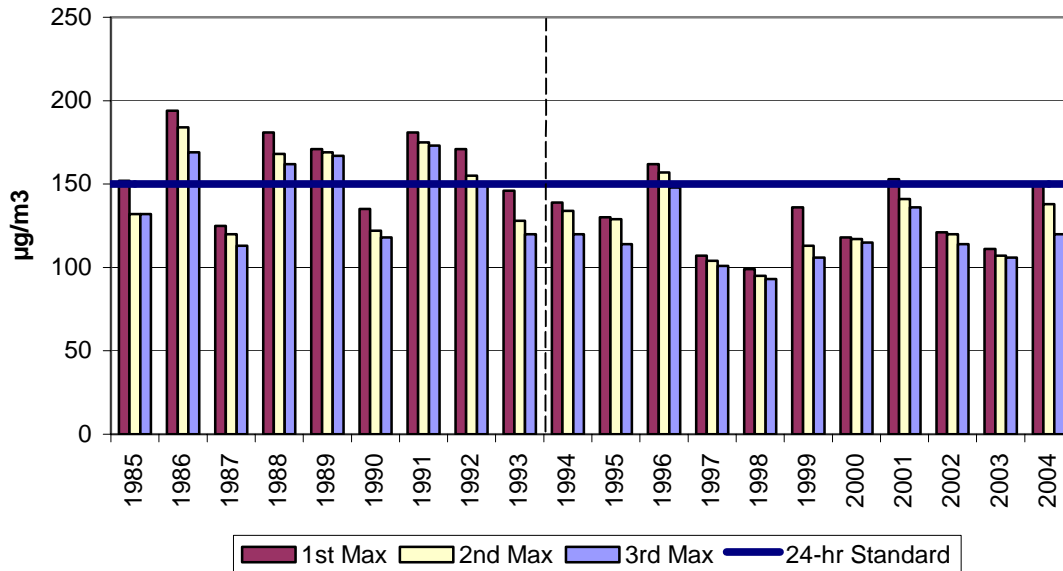
At the Cottonwood monitor: there were no such data points.



(Vertical dotted line indicates complete implementation of 1991 SIP control measures.)

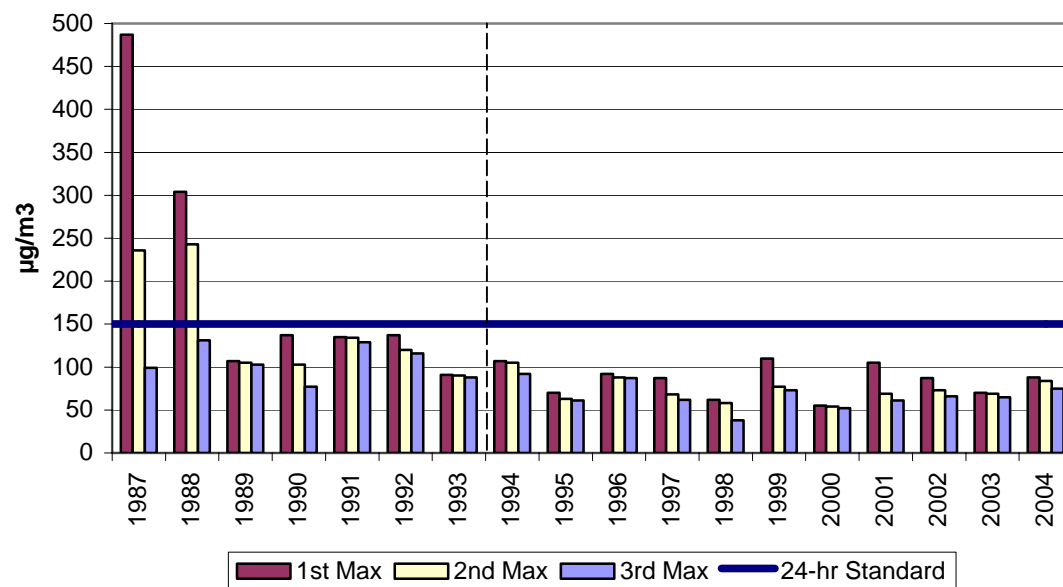


**Figure IX.A.25. 3 Highest 24-hr Concentrations  
North Salt Lake - 49-035-0012**

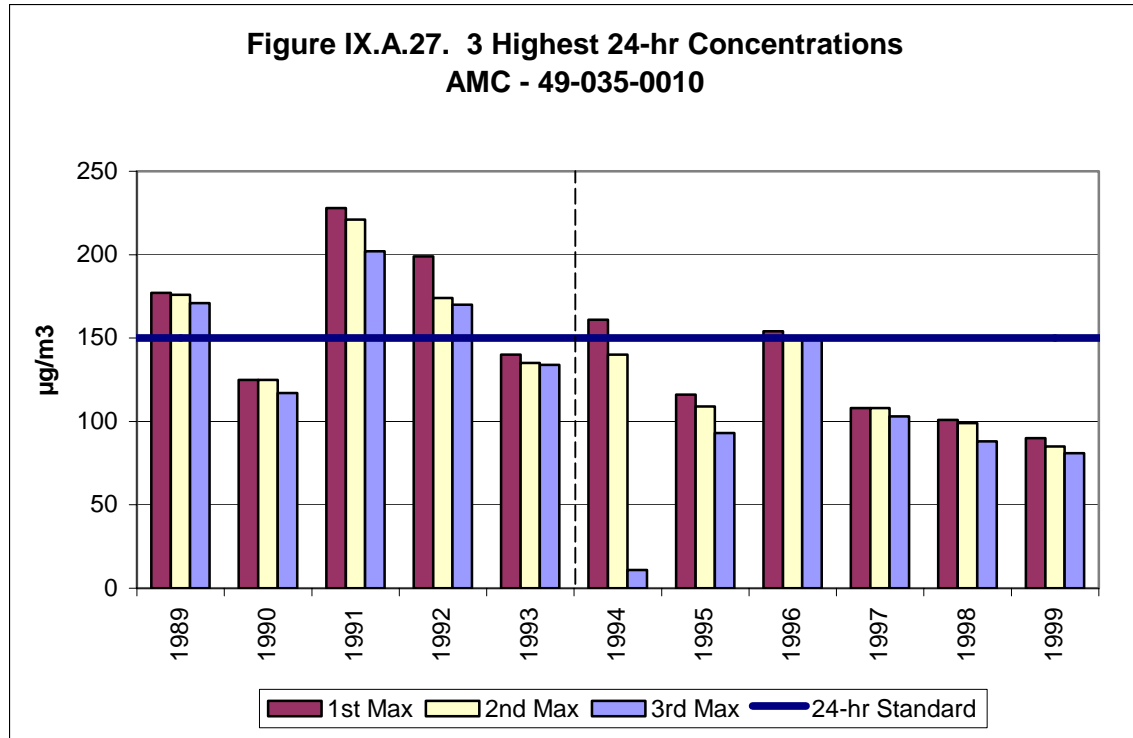


(Vertical dotted line indicates complete implementation of 1991 SIP control measures.)

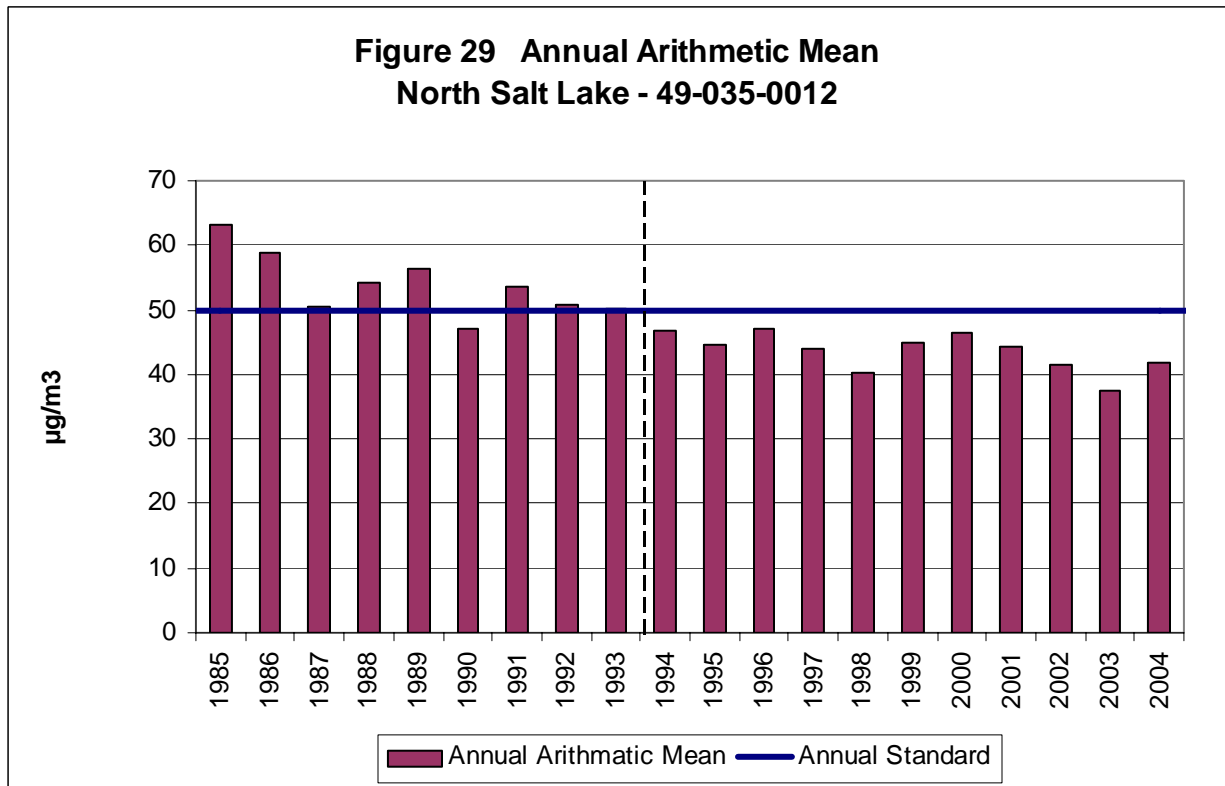
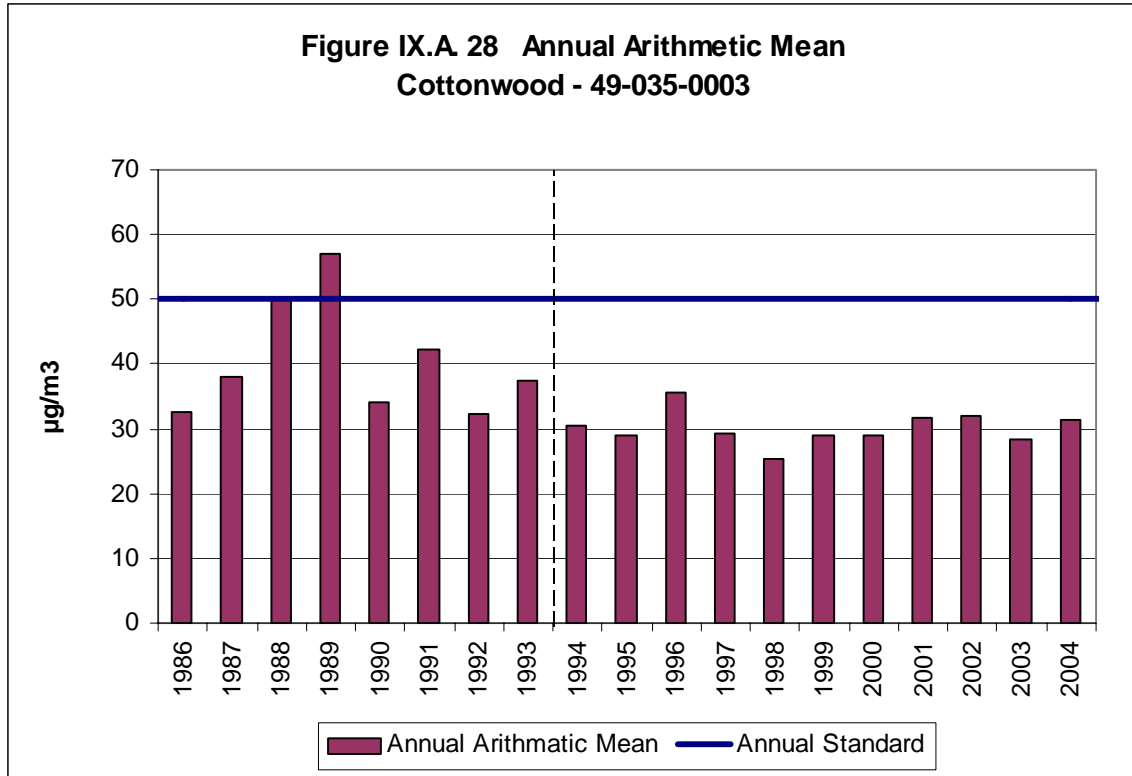
**Figure IX.A.26. 3 Highest 24-hr Concentrations  
Magna - 49-035-1001**

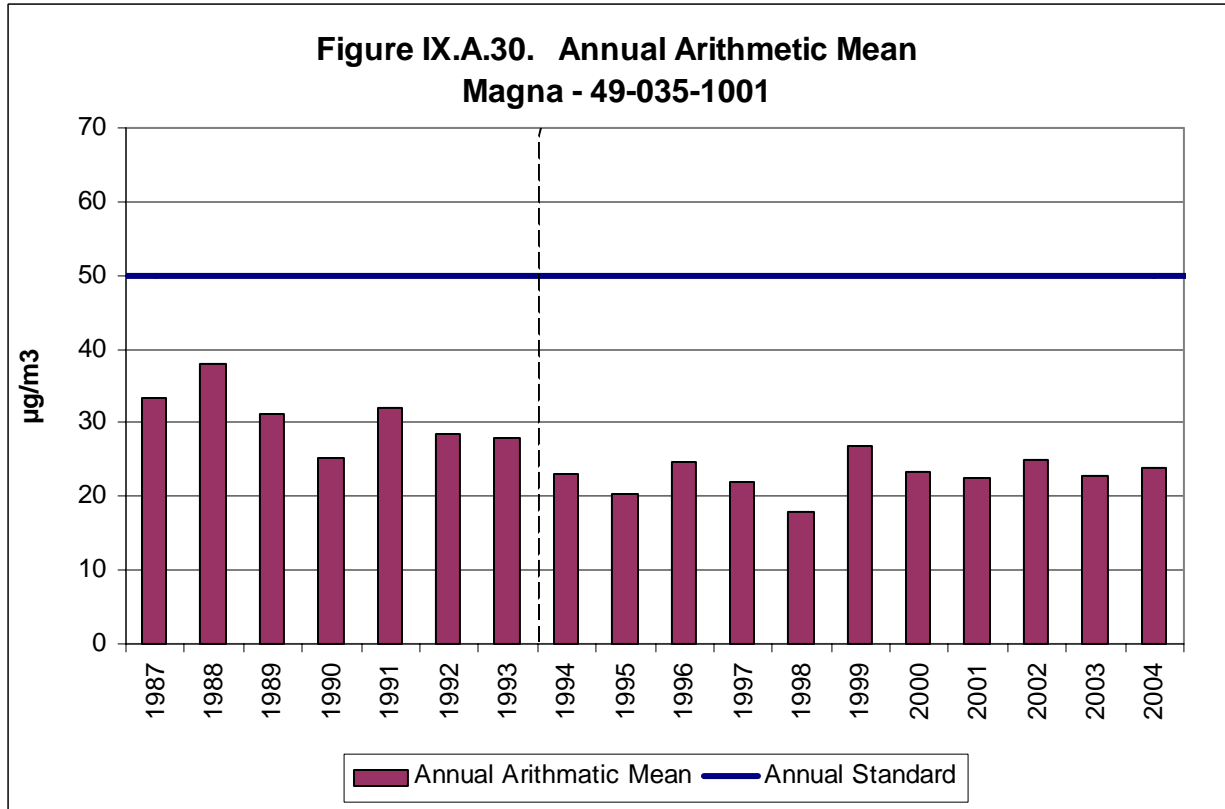


(Vertical dotted line indicates complete implementation of 1991 SIP control measures.)

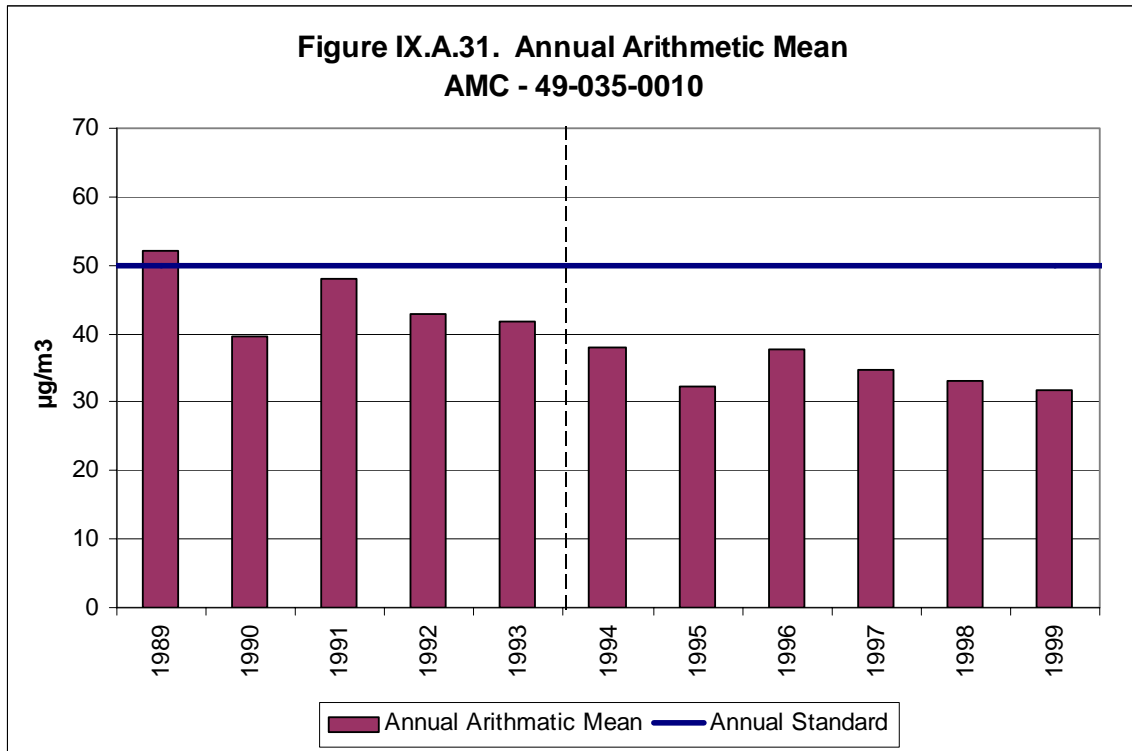


As discussed before in section IX.A.10.b(1), any data which had been flagged by DAQ and which had not yet been concurred with by EPA was not considered in preparing Figures IX.A.24 – 27. Data is flagged when circumstances indicate that it would represent an outlier in the data set and not be indicative of the entire airshed or the efforts to reasonably mitigate air pollution within. The data that was flagged has already been discussed, and the values were provided so that an additional set of Figures is not necessary.





1  
2



3  
4  
5

As discussed before in section IX.A.10.b(1), any data which had been flagged by DAQ and which had not yet been concurred with by EPA was generally not considered in preparing the maintenance plan, and this applies to Figures IX.A.28 – 31. Data is flagged when circumstances indicate that it would represent an outlier in the data set and not be indicative of the entire airshed or the efforts to reasonably mitigate air pollution within.

Nevertheless, when discussing the trend in annual mean concentrations, in the context of permanent and enforceable control measures that were implemented as part of the SIP, this data may have some relevance. As mentioned above, the focus of the control strategy developed for the 1991 PM<sub>10</sub> SIP was directed at episodes characterized by wintertime temperature inversions, elevated concentrations of secondary aerosol, and low wind speed. Under these conditions, blowing dust is nonexistent. This type of episode is also seasonal in nature, and thus primarily affects compliance with the 24-hr standard for PM<sub>10</sub>. It was assumed in the 1991 PM<sub>10</sub> SIP that the controls directed at these peak wintertime concentrations would be sufficient to control for the annual PM<sub>10</sub> standard as well. Since elevated concentrations of PM<sub>10</sub> outside of the wintertime season (November through February) are generally of a different character, and instead involve blowing dust or perhaps smoke from forest fires, it may be of interest to include data from high wind events, even if the intensity of the wind is such that it would constitute a natural event and thus be a candidate for a data flag.

To that end Figures IX.A.28 – 31 also indicate what the annual arithmetic mean PM<sub>10</sub> concentrations would be if this flagged data were to eventually be “not concurred with” by EPA. In either case, it must be concluded that the controls put in place from the 1991 PM<sub>10</sub> SIP have resulted in an improvement in air quality, and are sufficient to protect the annual PM<sub>10</sub> health standard.

#### **(b) Reduction in Emissions**

As stated above, EPA guidance (Calcagni) says that the State must be able to reasonably attribute the improvement in air quality to emission reductions that are permanent and enforceable. In making this showing, the State should estimate the percent reduction (from the year that was used to determine the design value) achieved by Federal measures such as motor vehicle control, as well as by control measures that have been adopted and implemented by the State.

In Salt Lake County, the design values at each of the representative monitors were measured in 1988 or 1989 (see SIP Subsections IX.A.3-5).

As mentioned before, the ambient air quality data presented in Subsection IX.A.10.b(3)(a) above includes values prior to these dates in order to give a representation of the air quality prior to the application of any control measures. It then includes data collected from then until the present time to illustrate the lasting effect of these controls. In discussing the effect of the controls, as well as the control measures themselves, however, it is important to keep in mind the time necessary for their implementation.

The nonattainment SIPs for all initial moderate PM<sub>10</sub> nonattainment areas included a statutory date for the implementation of reasonably available control measures (RACM). This date was December 10, 1993 (Section 189(a) CAA). Thus, 1994 marked the first year in which these control measures were reflected in the emissions inventories for Salt Lake County.

The nonattainment SIP for the Salt Lake County PM<sub>10</sub> nonattainment area included control strategies for stationary sources and area sources (including controls for woodburning, mobile sources, and road salting and sanding) of primary PM<sub>10</sub> emissions as well as sulfur oxide (SO<sub>x</sub>)

1 and nitrogen oxide (NO<sub>x</sub>) emissions, which are secondary sources of particulate emissions. This  
2 is discussed in SIP Subsection IX.A.6, and was reflected in the attainment demonstration  
3 presented in Subsection IX.A.5.

4  
5 The RACM control measures prescribed by the nonattainment SIP and their subsequent  
6 implementation by the State were discussed in more detail in a milestone report submitted for the  
7 area.

8  
9 Section 189(c) of the CAA identifies, as a required plan element, quantitative milestones which  
10 are to be achieved every 3 years, and which demonstrate reasonable further progress (RFP)  
11 toward attainment of the standard by the applicable date. As defined in CAA Section 171(1), the  
12 term *reasonable further progress* has the meaning of such annual incremental reductions in  
13 emissions of the relevant air pollutant as are required by Part D of the Act for the purpose of  
14 ensuring attainment of the NAAQS by the applicable date.

15  
16 Hence, the milestone report must demonstrate that all measures in the approved nonattainment  
17 SIP have been implemented and that the milestone has been met. In the case of initial moderate  
18 areas for PM<sub>10</sub>, this first milestone had the meaning of all control measures identified in the plan  
19 being sufficient to bring the area into compliance with the NAAQS by the statutory attainment  
20 date of December 31, 1994.

21  
22 Section 188(d) of the Act allows States to petition the Administrator for up to two one-year  
23 extensions of the attainment date, provided that all SIP elements have been implemented and that  
24 the ambient data collected in the area during the year preceding the extension year indicates that  
25 the area is on-target to attain the NAAQS. Presumably this is because the statutory attainment  
26 date for initial moderate PM<sub>10</sub> nonattainment areas occurred only one year after the statutory  
27 implementation date for RACM, the central control element of all implementation plans for such  
28 areas, and because three consecutive years of clean ambient data are needed to determine that an  
29 area has attained the standard. Because the milestone report and the request for extension of the  
30 attainment date both required a demonstration that all SIP elements had been implemented, as  
31 well as a showing of RFP, Utah combined these into a single analysis.

32  
33 Utah's actions to meet these requirements and EPA's subsequent review thereof are discussed in  
34 a Federal Register notice from Monday, June 18, 2001 (66 FR 32752). In this notice, EPA  
35 granted a one-year extension of the attainment date for the Salt Lake County PM<sub>10</sub> nonattainment  
36 area and determined that the area had attained the PM<sub>10</sub> NAAQS by December 31, 1995. The key  
37 elements of that FR notice are reiterated below.

38  
39 On May 11, 1995, Utah submitted a milestone report as required by sec.189(c)(2). On Sept.29,  
40 1995, Utah submitted a revised version of the milestone report. It estimated current emissions  
41 from all source categories covered by the SIP and compared those to actual emissions from 1988.  
42 Based on information the State submitted in 1995 EPA believes that Utah was in substantial  
43 compliance with the requirements and commitments in the SIP for the Salt Lake County PM<sub>10</sub>  
44 nonattainment area. The milestone report indicates that Utah had implemented most of its  
45 adopted control measures and had, therefore, substantially implemented the RACM/RAC  
46 requirements applicable to moderate PM<sub>10</sub> nonattainment areas. It showed that in Salt Lake  
47 County, emissions of PM<sub>10</sub>, SO<sub>2</sub> and NO<sub>x</sub> had been reduced by approximately 60,752 tpy (from  
48 150,292 down to 89,540). The effect of these emission reductions appears to be reflected in  
49 ambient measurements at the monitoring site [and] is evidence that the State's implementation of  
50 the PM<sub>10</sub> SIP control measures resulted in emission reductions amounting to RFP in the Salt Lake  
51 County PM<sub>10</sub> nonattainment area.

1 This Federal Register notice (66 FR 32752) and the milestone report from September 29, 1995  
2 have been included in the TSD.

3  
4 Furthermore, since these control measures are incorporated into the Utah SIP, the emission  
5 reductions that resulted are consistent with the notion of permanent and enforceable  
6 improvements in air quality. Taken together, the trends in ambient air quality illustrated in the  
7 preceding paragraph, along with the continued implementation of the nonattainment SIP for the  
8 Salt Lake County nonattainment area, provide a reliable indication that these improvements in air  
9 quality reflect the application of permanent steps to improve the air quality in the region, rather  
10 than just temporary economic or meteorological changes.

#### 11 12 **(4) State has Met Requirements Under Section 110 and Part D**

13  
14 *CAA 107(d)(3)(E)(v) - The State containing such area has met all requirements applicable to the*  
15 *area under section 110 and part D.* Section 110 of the CAA deals with the broad scope of state  
16 implementation plans and the capacity of the respective state agency to effectively administer  
17 such a plan. Sections I through VIII of Utah's SIP contain information relevant to these criteria.  
18 Part D deals specifically with plan requirements for nonattainment areas, and includes the  
19 requirements for a maintenance plan in Section 175A.

20  
21 Utah currently has an approved SIP that meets the requirements of section 110(a)(2) of the  
22 Federal Clean Air Act. Many of these elements have been in place for several decades. In the  
23 March 9, 2001 approval of Utah's Ogden City Maintenance Plan for Carbon Monoxide, EPA  
24 stated:

25  
26 On August 15, 1984, we approved revisions to Utah's SIP as meeting the  
27 requirements of section 110(a)(2) of the CAA (see 45 FR 32575). Although  
28 section 110 of the CAA was amended in 1990, most of the changes were not  
29 substantial. Thus, we have determined that the SIP revisions approved in 1984  
30 continue to satisfy the requirements of section 110(a)(2). For further detail, see  
31 45 FR 32575 dated August 15, 1984 (Volume 49, No. 159) or 66 FR 14079 dated  
32 March 9, 2001 (Volume 66, No. 47.)

33  
34 Part D of the Clean Air Act addresses "Plan Requirements for Nonattainment Areas". One of the  
35 pre-conditions for a maintenance plan is a fully approved attainment plan for the area. This is  
36 also discussed in section IX.A.10.b(2).

37  
38 For Salt Lake County, the Part D requirements for PM<sub>10</sub> were addressed in an attainment SIP  
39 approved by EPA on July 8, 1994 (59 FR 35036).

#### 40 41 **(5) Maintenance Plan for PM<sub>10</sub> Areas**

42  
43 As stated in the Act, an area may not request redesignation to attainment without first submitting,  
44 and then receiving EPA approval of, a maintenance plan. The plan is basically a quantitative  
45 showing that the area will continue to attain the NAAQS for an additional 10 years (from EPA  
46 approval), accompanied by sufficient assurance that the terms of the numeric demonstration will  
47 be administered by the State and by the EPA in an oversight capacity. The maintenance plan is  
48 the central criterion for redesignation. It is contained in the following subsection.

## IX.A.10.c Maintenance Plan

CAA 107(d)(3)(E)(iv) - The Administrator has fully approved a maintenance plan for the area as meeting the requirements of section 175A. An approved maintenance plan is one of several criteria necessary for area redesignation as outlined in CAA 107(d)(3)(E). The maintenance plan itself, as described in Section 175A of the CAA and further addressed in EPA guidance (Procedures for Processing Requests to Redesignate Areas to Attainment, John Calcagni to Regional Air Directors, September 4, 1992; or for the purpose of this document, simply “Calcagni”), has its own list of required elements. The following table is presented to summarize these requirements. Each will then be addressed in turn.

Table IX.A.32 Requirements of a Maintenance Plan			
Category	Requirement	Reference	Addressed in Section
Maintenance demonstration	Provide for maintenance of the relevant NAAQS in the area for at least 10 years after redesignation.	CAA: Sec 175A(a)	IX.A.10.c(1)
Revise in 8 Years	The State must submit an additional revision to the plan, 8 years after redesignation, showing an additional 10 years of maintenance.	CAA: Sec 175A(b)	IX.A.10.c(8)
Continued Implementation of Nonattainment Area Control Strategy	The Clean Air Act requires continued implementation of the nonattainment area control strategy unless such measures are shown to be unnecessary for maintenance or are replaced with measures that achieve equivalent reductions.	CAA: Sec 175A(c), CAA Sec 110(l), Calcagni memo	IX.A.10.c(7)
Contingency Measures	Areas seeking redesignation from nonattainment to attainment are required to develop contingency measures that include State commitments to implement additional control measures in response to future violations of the NAAQS.	CAA: Sec 175A(d)	IX.A.10.c(10)
Verification of Continued Maintenance	The maintenance plan must indicate how the State will track the progress of the maintenance plan.	Calcagni memo	IX.A.10.c(9)

### (1) Demonstration of Maintenance - Modeling Analysis

CAA 175A(a) - Each State which submits a request under section 107(d) for redesignation of a nonattainment area as an area which has attained the NAAQS shall also submit a revision of the applicable implementation plan to provide for maintenance of the NAAQS for at least 10 years after the redesignation. The plan shall contain such additional measures, if any, as may be required to ensure such maintenance. The maintenance demonstration is discussed in EPA guidance (Calcagni) as one of the core provisions that should be considered by states for inclusion in a maintenance plan.

According to Calcagni, a State may generally demonstrate maintenance of the NAAQS by either showing that future emissions of a pollutant or its precursors will not exceed the level of the attainment inventory (discussed below) or by modeling to show that the future mix of sources and



1 emission rates will not cause a violation of the NAAQS. Utah has elected to make its  
2 demonstration based on air quality modeling. The guidance goes on to say that, in cases where a  
3 nonattainment SIP was based on air quality modeling, the maintenance plan should be based upon  
4 the same level of modeling used before. Furthermore, it says, such modeling should be consistent  
5 with current EPA modeling guidance.

6  
7 The existing PM<sub>10</sub> nonattainment SIP demonstrations for both Salt Lake and Utah Counties were  
8 based on a statistical modeling approach called chemical mass balance (CMB). This is a receptor  
9 based model that does not directly factor meteorology or dispersion characteristics into its  
10 predictions. Furthermore, CMB is limited in its treatment of secondary aerosol formation, which  
11 has historically accounted for between 65% and 85% of the overall PM<sub>10</sub> collected at the  
12 monitoring stations. While the success of these nonattainment SIPs is more or less an  
13 endorsement of the CMB modeling upon which they were founded, EPA felt that any subsequent  
14 demonstration of maintenance should rely instead on a model that is more comprehensive in its  
15 assumptions.

16  
17 In consultation with EPA Region VIII, DAQ decided to base the new Maintenance Plan upon a  
18 grid-based aerosol model called UAM-AERO. This model is an extension of the widely used  
19 photochemical model, the Urban Airshed Model (UAM) Version IV, which has been adapted to  
20 treat aerosol processes. DAQ established a UAM-AERO modeling domain that included each of  
21 Utah's three PM<sub>10</sub> nonattainment areas. This single comprehensive modeling analysis serves as  
22 the basis for the maintenance demonstration for each area.

23  
24 The model was applied to address elevated 24-hour concentrations of PM<sub>10</sub> along the Wasatch  
25 Front (WF). These develop during winter-time episodes of regional scale high pressure and  
26 associated valley temperature inversions. The inversions promote the accumulation of PM<sub>10</sub> and  
27 PM<sub>10</sub> precursor gases that lead to significant secondary aerosol formation. Before the  
28 nonattainment SIPs were implemented, these ambient values often exceeded the 24-hour health  
29 standard for PM<sub>10</sub>.

30  
31 In this analysis, DAQ has employed UAM-AERO to evaluate the airshed under worst case  
32 winter-time inversion conditions. In order to do so, the model considers two historical episodes:  
33 1) January 1-10, 2001 and 2) February 1-8, 2002. Episode selection was based on criteria that  
34 included meteorology, observed PM<sub>10</sub> concentrations, and data availability. Further discussion  
35 concerning episode selection can be found in Section 2 of the modeling portion of the technical  
36 support document (TSD).

37  
38 Despite numerous severe inversion episodes during the past decade, PM<sub>10</sub> concentrations have not  
39 been sufficient to cause a violation of the NAAQS. Consequently, the two selected episodes do  
40 not represent NAAQS violations, but do capture elevated PM<sub>10</sub> concentrations, worst-case  
41 meteorology, and current emission levels. Therefore, by modeling these episodes and projecting  
42 emissions into future years, the analysis should accurately reflect the ability of the nonattainment  
43 areas to maintain the PM<sub>10</sub> NAAQs over the next 10 years.

44  
45 The DAQ modeling analysis requires two main inputs: meteorological data and emissions data.  
46 The applications of these inputs are discussed below.

#### 47 48 (a) Meteorological data

49  
50 Recent UDAQ meteorological modeling projects using advanced "state of the science" prognostic  
51 meteorological models have proven unsuccessful in simulating highly variable Wasatch Front  
52 meteorology during inversion conditions. These problems led UDAQ to choose a diagnostic

1 meteorological model called the Diagnostic Wind Model (DWM) model for the January 2001 and  
2 February 2002 episodes to avert many of the past modeling problems. The DWM assimilates  
3 actual observations of wind speed and direction to diagnose and construct a consistent wind field.

4  
5 UDAQ embarked on a 4-phase modeling approach in order to develop the most realistic wind  
6 fields possible. Each phase of the 4-phase modeling approach utilized unique combinations of  
7 observed meteorological data for each analysis. Each of the 4 phases is described below:

#### 8 9 Phase 1

10  
11 The DWM model was run utilizing 60-100 surface observing stations, two radiosondes, and two  
12 SODARs per day. The surface station data was taken from the University of Utah MESOWEST  
13 database and included a wide variety of station types. Phase 1 of modeling utilized only surface  
14 stations with an elevation of 5,500ft or lower. The National Weather Service Salt Lake City  
15 radiosonde data was used along with two DAQ SODAR units operated in Utah and Salt Lake  
16 valleys. It was thought that the multitude of available data would allow DWM to produce  
17 representative wind fields.

18  
19 UAM-AERO results showed modeled PM<sub>10</sub> values that were only 40-50% of the observed values.  
20 Model output evaluation showed that PM<sub>10</sub> was being advected out of the Salt Lake Valley (SLV)  
21 and the model domain to the SE. Afternoon up-valley NW winds moved PM<sub>10</sub> into the mountains  
22 to the SE of the SLV. At night, winds became light and variable at most surface stations and as a  
23 result were unable to return the PM<sub>10</sub> back to the SLV. Additionally, DAQ's hypothesized  
24 benefit of having a multitude of surface stations actually induced unrealistic vertical motions due  
25 to surface convergence of widely varying wind directions.

#### 26 27 Phase 2

28  
29 The failings of phase 1 encouraged DAQ to be more selective of the surface stations used in  
30 DWM. First, the Salt Lake Valley SODAR was discarded due to observations that were  
31 incongruent with the Utah Valley SODAR and the Salt Lake City radiosonde. Second, DAQ  
32 selected only the DAQ operated surface stations. These surface stations are situated in strategic  
33 locations across the Wasatch Front. 11 DAQ stations were used. The phase 2 hypothesis was  
34 that the more selective set of surface stations might produce a wind field with less convergence  
35 and resultant vertical motions.

36  
37 DAQ found that the phase 2 wind fields produce periods of daytime NW winds that advected  
38 pollutants out of the SLV. The nocturnal and morning winds were light and variable and were  
39 unable to return the pollutants to the SLV. Most of the observations within the SLV show a trend  
40 of daytime up-valley flow and nighttime weak variable flow. In reality, the daytime flow re-  
41 circulates within the boundaries of the inversion but in UAM-AERO the continuous grid network  
42 cannot retain the flow within the open sided grid cells of the SLV.

#### 43 44 Phase 3

45  
46 Phase 2 results showed transport of PM<sub>10</sub> out of the SLV. Model evaluation clearly showed a  
47 direct link with the observation wind direction and speeds. Phase 3 tested the possibility that a  
48 single station located in SLV might produce a wind field that has a more even distribution of  
49 wind direction and speeds. In other words, is there a station in SLV that is representative of the  
50 valley but where daytime winds and nighttime winds balance each other? If so, developing a  
51 wind field from a single station may reduce advection out of the SLV.

Three separate wind fields were developed in phase 3. These wind fields utilized the centrally located and well sited DAQ Hawthorne and West Valley monitors as well as another well sited but southeasterly located DAQ Cottonwood station. The results of phase 3 modeling again showed advection out of the SLV and the domain. Stronger daytime NW winds compared to nighttime light and variable winds again forced the loss of PM<sub>10</sub>.

#### Phase 4

Phases 1-3 clearly demonstrated the inability of the DWM model to accurately represent the conceptual understanding of inversion conditions. The model deficiencies arise from the model grid-cell structure. The model grid cells are continuous and are unable to “trap” or contain air within an inversion layer. The real wind observations in the SLV do have advective properties that would allow the pollutants to move beyond the boundaries of the SLV under non-inversion conditions. However, under inversion conditions the advective properties of the real wind observations are negated by a forced recirculation of air within the inversion layer by the containing boundaries of the inversion.

In phase 4, a purely idealized flow was created in the attempt to retain pollutants in the SLV. A bimodal wind direction field was created using an afternoon NW wind (330) and an evening, night, and morning SE wind (140). These directions correspond to daytime up-valley flow and nighttime down-valley flow. Wind speeds were chosen so that advection was limited to within the boundaries of the SLV. This wind field, while idealized, fits the conceptual understanding of inversion conditions. Phase 4 modeling retains PM<sub>10</sub> within the SLV and UAM-AERO PM<sub>10</sub> results show excellent agreement with the observations.

#### (b) Emissions Data

Area, point, and mobile emissions inventories were compiled for all sources within the modeling domain. Inventories included primary PM<sub>10</sub>, sulfur dioxide (SO<sub>2</sub>), oxides of nitrogen (NO<sub>x</sub>), carbon monoxide (CO), and volatile organic compounds (VOC). In addition, an ammonia (NH<sub>3</sub>) inventory was estimated for area and mobile sources. Estimates of biogenic emissions were not included in the analysis because the episodes occurred in January and February when biogenic emissions are negligible. Other seasonal adjustments were also made to the inventory (adjustments are described in the modeling portion of the TSD). Base-year and projection inventories are also described in more detail in the TSD.

Emission inventories are processed and spatially placed in the modeling domain by the Sparse Matrix Operator Kernel Emission (SMOKE) modeling system. SMOKE was developed by EPA for integration into the Models-3 Air Quality Modeling System and has been used in many air quality studies. To ensure that the model represents actual emissions during each model episode day, SMOKE uses source specific Source Classification Codes to chemically speciate and temporally allocate emissions. In addition, SMOKE uses other emission characteristics, such as stack height, exit velocity, and plume temperature to place emissions in the correct vertical layer of UAM-AERO. Mobile and other area source emissions are treated as ground level emissions and input into the lowest model layer.

#### (c) Modeling Results

Projection year modeling was completed for the years 2005, 2008, 2011, 2014, 2015, and 2017. EPA’s most current modeling guidance recommends that model predictions be used in a relative sense rather than an absolute sense. Applying the model this way is done by calculating a “relative reduction factor” (RRF) for grid cells that are co-located with a PM<sub>10</sub> monitor. RRF

values were computed for each day of the base-case modeling years (January 2001 and February 2002) and subsequently applied to the future year predictions. The technique for creating the individual RRF is described in section 7 of the modeling TSD.

Results demonstrated that modeled  $PM_{10}$  concentrations are highest in 2005. From there they decline until reaching a minimum value in 2011 or 2014, and then increase again through 2017. No  $PM_{10}$  values greater than 150  $\mu g/m^3$  were modeled for any *ambient air* using either episode. Ambient air means anywhere that would be accessible to the general public. There were two grid cells which showed predicted concentrations in excess of 150  $\mu g/m^3$ , but they are both located on the property of Kennecott Utah Copper Corp. The general public does not have access to this area, and so these grid-cells do not represent ambient air. Results of the modeling analysis are presented below for each of Utah's three  $PM_{10}$  nonattainment areas.

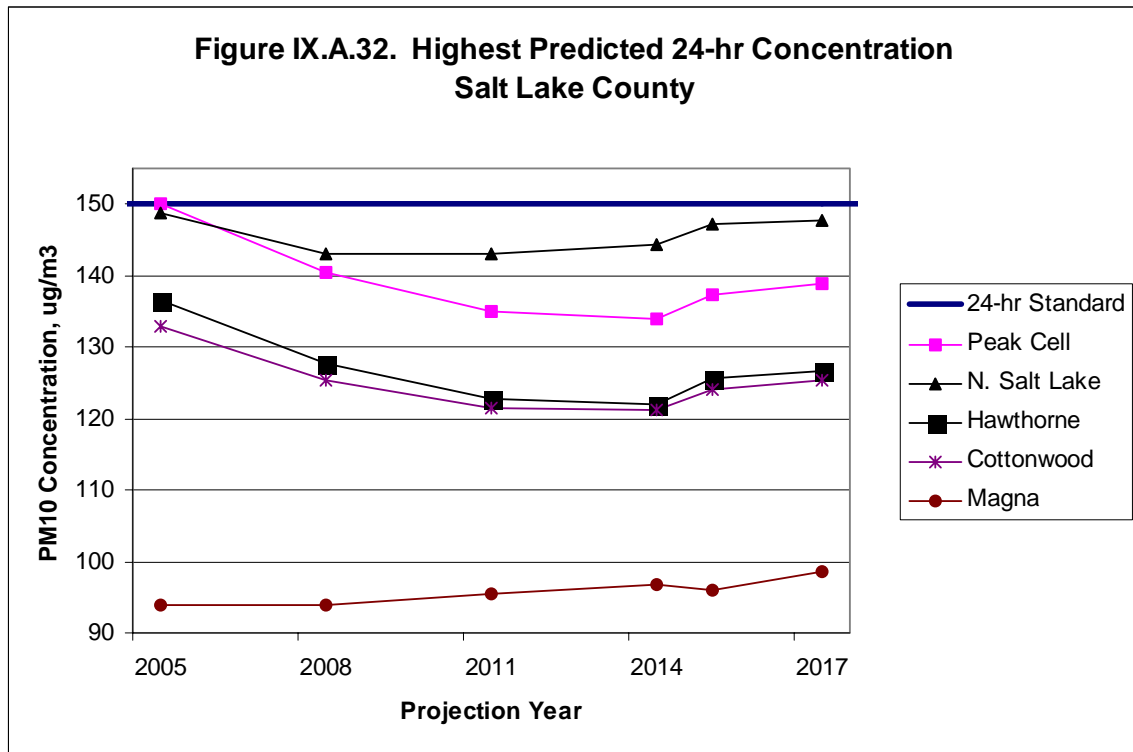
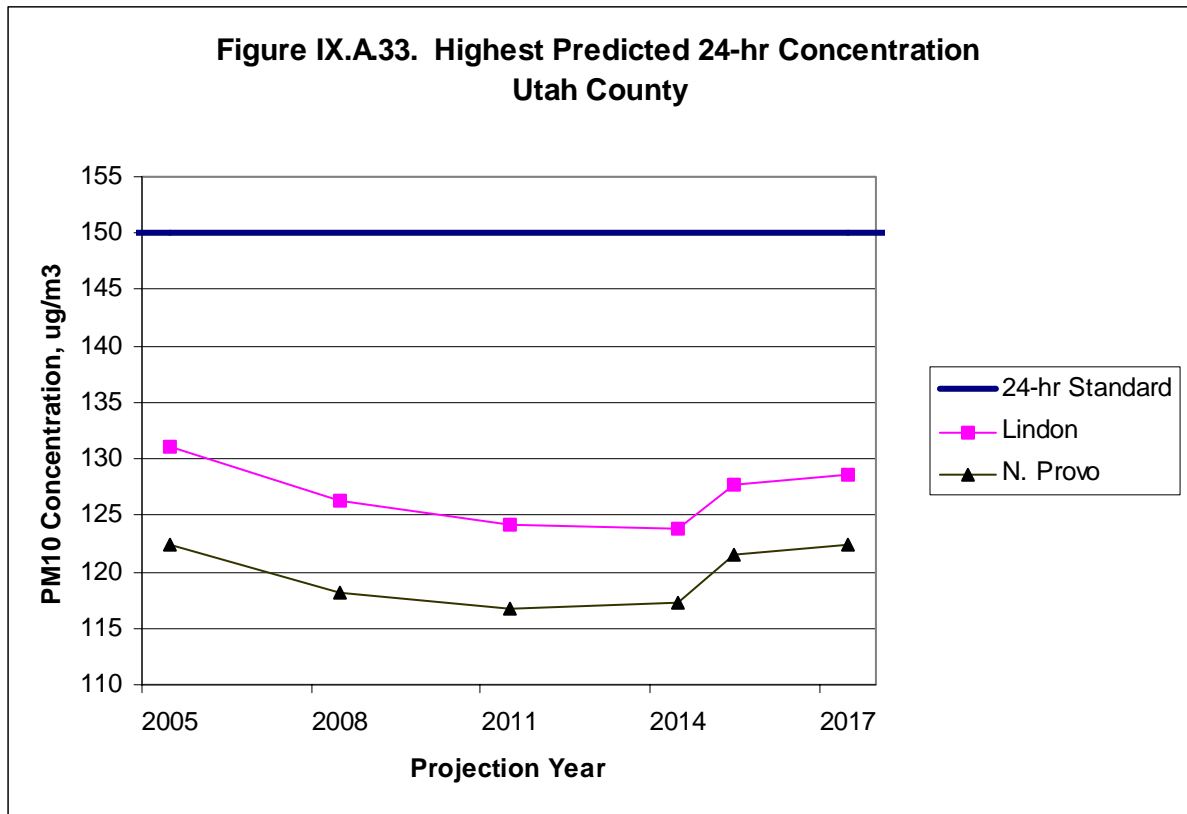


Figure IX.A.32 above illustrates the trend of predicted concentrations at the monitoring stations and the highest modeled grid cells in the Salt Lake County  $PM_{10}$  nonattainment area and the entire domain. The peak cell is near the Cottonwood monitor. These data reflect the modeled  $PM_{10}$  concentrations after application of the RRF.

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Figure IX.A.33 above illustrates the trend of predicted concentrations at the highest modeled grid-cells in the Utah County PM<sub>10</sub> nonattainment area. The highest grid cell is located near the Lindon monitor. The data reflects the modeled PM<sub>10</sub> concentrations after application of the RRF. The model predicts a significant margin of “safety” with respect to the health standard throughout the projection years.

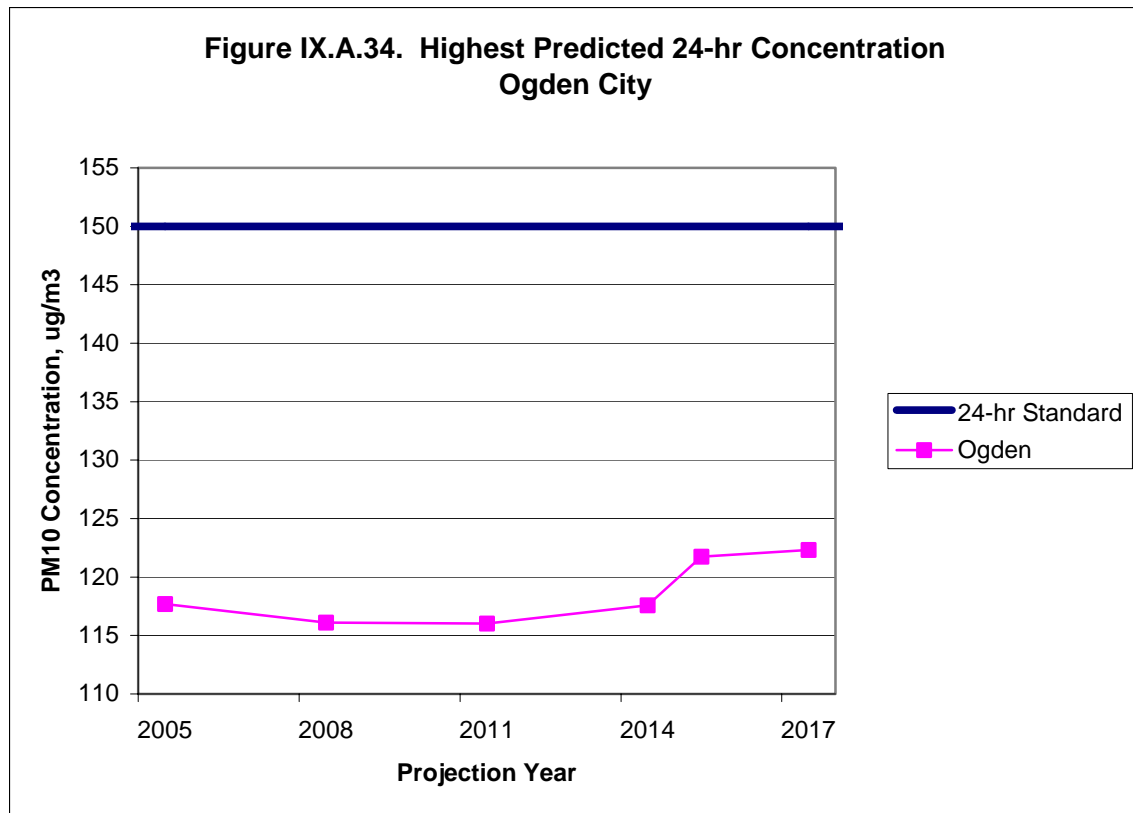


Figure IX.A.34 above illustrates the trend of predicted concentrations at the highest modeled grid cells in the Ogden City PM<sub>10</sub> nonattainment area. The monitor is located in this highest grid cell. The data reflects the modeled PM<sub>10</sub> concentrations after application of the RRF. The model predicts a significant margin of “safety” with respect to the health standard throughout the projection years.

#### (d) Annual Standard

As presented above, the modeled demonstration of maintenance was designed to address the 24-hour standard for PM<sub>10</sub> during the winter conditions that drive secondary aerosol formation. This scenario has historically led to elevated concentrations of PM<sub>10</sub> along the Wasatch Front.

The attainment demonstrations in the 1991 PM<sub>10</sub> SIP were also designed to address the 24-hour standard, based on EPA guidance which states that “The SIP related emission limits should be based on the NAAQS (annual or 24-hour) which result in the most stringent control requirements” (see Subsection IX.A.9). As stated (by EPA or in that version of the SIP), it was assumed that “the application of many of the control strategies that are being implemented to reduce the 24-hour PM<sub>10</sub> concentrations will also result in a reduction of the annual PM<sub>10</sub> concentrations even though they are designed to reduce wintertime 24-hr concentrations.” Due to the disparity in concentrations observed during the remainder of the year, “the winter season is the period that has the greatest impact on the annual average (see Table IX.A.24), and controlling PM<sub>10</sub> concentrations during the winter will have the greatest impact on the annual average.”

As discussed in the section concerning improvements in air quality, the downward trend in the annual arithmetic mean concentrations is reflective of these control strategies, many of which

1 were directed at the wintertime 24-hour concentrations. This corroborates the assumption made  
2 in the 1991 SIP.

3  
4 This maintenance plan will continue to rely upon that assumption. Since the control strategies  
5 required by the 1991 SIP were sufficient to achieve compliance with the 24-hour standard, the  
6 maintenance plan requires no new control strategies for continued compliance. Since the controls  
7 required by the 1991 SIP were deemed sufficient to ensure compliance with the annual standard,  
8 no further controls will be necessary to achieve continued compliance with that standard either.  
9 Thus, the modeled demonstration of attainment for the 24-hour PM<sub>10</sub> standard provides adequate  
10 assurance that the annual PM<sub>10</sub> standard will be protected as well.

11  
12 **(e) Magna**

13  
14 The violations of the PM<sub>10</sub> standard in Magna were caused primarily by the blowing of tailings  
15 from the Kennecott tailings pond under certain meteorological conditions while the plant was  
16 shut down.

17  
18 While this scenario was never explicitly modeled in the 1991 SIP, it was addressed by requiring  
19 reasonably available control methods (RACM), which took the form of a comprehensive fugitive  
20 dust plan. The terms of this dust plan have been incorporated into the SIP at Section IX Part H.

21  
22  
23 **(2) Attainment Inventory**

24  
25 The attainment inventory is discussed in EPA guidance (Calcagni) as another one of the core  
26 provisions that should be considered by states for inclusion in a maintenance plan.

27  
28 According to Calcagni, the stated purpose of the attainment inventory is to establish the level of  
29 emissions during the time periods associated with monitoring data showing attainment.

30  
31 In cases such as this, where a maintenance demonstration is founded on a modeling analysis, the  
32 attainment inventory is necessary to validate the model with respect to the ambient measurements  
33 that were made at the air monitoring locations during the commensurate period in time. For this  
34 analysis, base-year attainment inventories were compiled for 2001 and 2002.

35  
36 Continued attainment is then demonstrated by running an air quality model, which considers  
37 factors related to meteorology, topography, and certain stack characteristics as well as the  
38 emissions of an air contaminant. After evaluating all of these factors, the model predicts  
39 concentrations of the air contaminant that are then compared to the health standard.

40  
41 This implies that the analysis will require additional projection year inventories. Calcagni speaks  
42 to this as well, noting that the projection inventory should consider future growth, including  
43 population and industry, should be consistent with the base-year attainment inventory, and should  
44 document data inputs and assumptions. Any assumptions concerning emission rates must reflect  
45 permanent, enforceable measures.

46  
47 Utah has compiled both attainment and projection inventories for use in a quantitative modeling  
48 demonstration. The emissions contained in the inventories include sources located within a  
49 regional area called a modeling domain. The modeling domain encompasses all three areas  
50 within the state that were designated as nonattainment areas for PM<sub>10</sub>: Salt Lake County, Utah  
51 County, and Ogden City, as well as a bordering region see Figure IX.A.23.

1 There are three general categories of sources included in these inventories: industrial point  
2 sources, smaller area sources, and mobile sources.

3  
4 For each of these source categories, the pollutants that were inventoried included: particulate  
5 matter with an aerodynamic diameter of ten microns or less (PM<sub>10</sub>), sulfur dioxide (SO<sub>2</sub>), oxides  
6 of nitrogen (NO<sub>x</sub>), carbon monoxide (CO), and volatile organic compounds (VOC). SO<sub>2</sub> and  
7 NO<sub>x</sub> are specifically defined as PM<sub>10</sub> precursors, that is, compounds that, after being emitted to  
8 the atmosphere, undergo chemical or physical change to become PM<sub>10</sub>. Any PM<sub>10</sub> that is created  
9 in this way is referred to as secondary aerosol. The UAM-AERO model also considers ammonia,  
10 CO and VOC to be contributing factors in the formation of secondary aerosol.

11  
12 The unit of measure for point and area sources is the traditional tons per year, but the UAM-  
13 AERO model includes a pre-processor that converts these emission rates to hourly increments  
14 throughout each day for each episode. Mobile source emissions are reported in terms of tons per  
15 day, and are also pre-processed by the model.

16  
17 The basis for the point source and area inventories, for both the base-year attainment inventories  
18 as well as all future-year projection inventories, was the 2001 inventory of actual emissions that  
19 had already been compiled by the Division of Air Quality.

20  
21 Area sources, as well as the smaller point sources, were projected forward from 2001, using  
22 population and economic forecasts from the Governor's Office of Planning and Budget.

23  
24 The larger point sources - those whose emissions could exceed 100 tons per year (tpy) of PM<sub>10</sub>,  
25 200 tpy NO<sub>x</sub>, or 250 tpy SO<sub>2</sub> - were projected somewhat differently. These sources were  
26 evaluated at their maximum emission rates, based on existing regulatory conditions of operation  
27 and construction. Furthermore, they were evaluated on their capability to emit on a short-term  
28 basis. As such, the projected emissions from these large sources reflect enforceable emission  
29 limits that are pertinent to the protection of public health with respect to a 24-hour standard for  
30 PM<sub>10</sub>. Point source projections also include any current emission reduction credits (banked  
31 emissions).

32  
33 Mobile source emissions were calculated for each year using MOBILE6.1/6.2 in conjunction with  
34 the appropriate estimates for vehicle miles traveled (VMT). VMT estimates for the urban  
35 counties were based on a travel demand model that is only run periodically for specific projection  
36 years. VMT for intervening years were estimated by interpolation.

37  
38 Since this SIP subsection takes the form of a maintenance plan, it must demonstrate that the area  
39 will continue to attain the PM<sub>10</sub> NAAQS throughout a period of ten years from the date of EPA  
40 approval. It is also necessary to "spot check" this ten-year interval. Hence, projection inventories  
41 were prepared for the following years: 2005, 2008, 2011, 2014, and 2017 (the ten-year mark from  
42 anticipated EPA approval). 2015 was also projected as possible planning year for the purpose of  
43 future transportation conformity analyses.

44  
45 The following table is provided to summarize these inventories. As described, they represent  
46 point, area, and mobile sources in the modeling domain. They include PM<sub>10</sub>, SO<sub>2</sub>, NO<sub>x</sub>, CO and  
47 VOC, and they span from the base-years (2001 and 2002) through the projection years of 2005,  
48 2008, 2011, 2014, and 2017.



**Table IX.A.33 Emission Inventories for the Modeling Domain. Actual Emissions for 2001-2002; Emission Projections for 2005-2017**

<b>Input</b>								
<b>CO</b>								
Point (Tons/Year) *	30,850.43	25,237.47	63,184.04	64,254.04	65,401.66	66,512.50	66,882.78	67,590.87
Area (Tons/Year)	184,125.74	186,748.59	195,132.88	203,263.30	211,525.98	219,584.84	222,202.47	227,463.10
On-Road (Tons/Day) **	1,801.72	1,935.13	2,327.33	1,987.96	1,896.95	1,832.70	1,808.67	1,824.95
<b>NOx</b>								
Point (Tons/Year) *	17,263.27	15,606.80	37,618.03	37,947.67	38,290.32	38,614.84	38,722.94	38,918.61
Area (Tons/Year)	31,822.89	31,665.83	31,555.39	31,043.87	30,622.93	30,660.63	30,756.97	31,044.91
On-Road (Tons/Day) **	160.57	161.19	181.55	145.70	117.38	90.91	84.96	82.75
<b>PM10</b>								
Point (Tons/Year) *	7,418.19	6,818.33	14,436.83	14,612.90	14,779.78	14,938.94	14,991.99	15,077.57
Area (Tons/Year)	16,314.20	16,231.96	16,347.93	16,595.09	16,974.18	17,365.87	17,484.59	17,692.48
On-Road (Tons/Day) **	51.30	52.33	71.02	75.85	81.16	90.00	104.84	105.38
<b>SOx</b>								
Point (Tons/Year) *	8,884.91	6,048.77	35,494.35	35,550.44	35,607.07	35,659.65	35,677.17	35,703.41
Area (Tons/Year)	2,134.56	2,149.09	2,219.34	2,294.93	2,370.11	2,441.92	2,465.20	2,510.63
On-Road (Tons/Day) **	5.32	5.46	7.29	7.43	8.04	8.63	8.83	8.83
<b>VOC</b>								
Point (Tons/Year) *	5,309.57	5,183.67	8,034.87	8,206.38	8,379.58	8,545.44	8,600.73	8,696.39
Area (Tons/Year)	150,738.67	150,585.37	151,664.80	153,339.12	156,232.05	159,330.42	160,290.66	162,032.65
On-Road (Tons/Day) **	89.16	89.44	88.80	71.74	60.37	51.39	49.96	49.77

\* Point source totals for 2001 & 2002 include slight variations between specific episode days.

The numbers reported in this table reflect the highest number for each pollutant.

Banked emissions are included in all projection year inventories (2005 forward).

\*\* On-Road source totals for every year include slight variations between specific episode days.

The numbers reported in this table reflect the episode day on which the NOx and the PM10 were the highest.

More detail concerning any element of the inventory can be found at the appropriate section of the Technical Support Document (TSD). More detail about the general construction of the inventory may be found in the Inventory Preparation Plan at Section 1.a of the TSD. Discussion concerning any adjustments that were made to the inventoried emissions prior to use in the UAM-AERO model may be found in the modeling section of the TSD.

### (3) Emissions Limitations

As discussed above, there was a distinction made in the modeling of projected emissions for the point source category. The larger sources within the modeling domain were modeled at their maximum allowable emissions, as determined on a 24-hour basis.

A subset of these “large” sources was subsequently identified for the purpose of establishing emission limitations as part of the Utah SIP. This subset includes any large source located within any of the three current nonattainment areas for PM<sub>10</sub>: Salt Lake County, Utah County, or Ogden

City. A source was also included in the subset if it was currently regulated for PM<sub>10</sub> under section IX, Part H of the Utah SIP. There were several sources in Davis County that were close enough to the border so as to have originally been included in the original PM<sub>10</sub> SIP.

As discussed before, the emission limits for these sources had already been reflected in the projected emissions inventories used in the modeling analysis. Many of these limits appear in State issued Approval Orders or Title V Operating Permits. Such regulatory documents typically include many emission limits and operating restrictions. Only those limits that are truly significant from an airshed management perspective have been incorporated specifically into the SIP.

These limits are incorporated in the Utah SIP at Section IX, Part H (formerly Sections 1 and 2 of Appendix A to Section IX, Part A), and as such remain federally enforceable.

These conditions demonstrate maintenance through 2017 see subsections IX.A.10.c.(1) and (2).

#### **(4) Emission Reduction Credits**

Existing Emission Reduction Credits on file with the Utah Division of Air Quality were included in the modeled demonstration of maintenance outlined in Subsection IX.A.10.c(1). Concerning the subsequent banking of any emission reduction credits for PM<sub>10</sub>, or precursors thereto, the emission levels contained in the modeled demonstration of maintenance outlined in Subsection IX.A.10.c(1), or incorporated into the Utah SIP at Section IX, Part H (formerly Appendix A to Section IX, Part A,) should serve to establish a baseline for the emission rates relied upon by this maintenance plan. These emission reduction credits, whether pre-existing or established subsequent to the approval of this SIP revision, are allowed to the extent that they are established by actual, verifiable, and enforceable reductions in emissions.

#### **(5) Additional Controls for Future Years**

Since the emission limitations discussed in subsection IX.A.10.c.(3) remain federally enforceable and, as demonstrated in IX.A.10.c(1) above, are sufficient to ensure continued attainment of the PM<sub>10</sub> NAAQS, there is no need to require any additional control measures to maintain the PM<sub>10</sub> NAAQS.

#### **(6) Mobile Source Budget for Purposes of Conformity**

The transportation conformity provisions of section 176(c)(2)(A) of the Clean Air Act (CAA) require regional transportation plans and programs to show that "...emissions expected from implementation of plans and programs are consistent with estimates of emissions from motor vehicles and necessary emissions reductions contained in the applicable implementation plan..." EPA's transportation conformity regulation (40 CFR 93.118, last amended at 69 FR 40072, July 1, 2004) also requires that motor vehicle emission budgets must be established for the last year of the maintenance plan, and may be established for any years deemed appropriate. If the maintenance plan does not establish motor vehicle emissions budgets for any years other than the last year of the maintenance plan, the conformity regulation requires that a "demonstration of consistency with the motor vehicle emissions budgets must be accompanied by a qualitative finding that there are not factors which would cause or contribute to a new violation or exacerbate an existing violation in the years before the last year of the maintenance plan." The normal

interagency consultation process required by the regulation shall determine what must be considered in order to make such a finding.

Road dust projections were estimated using the EPA PART5 particulate emissions model. However, prior to applying these emission estimates in an attainment demonstration using the UAM-AERO model, the road dust inventory was discounted by 75% as part of the attainment modeling method to more accurately reflect the conventional understanding of the relationship of modeled road dust emissions and actual fugitive dust measurements recorded by the State air quality monitoring network. The mobile source budgets set forth in this Plan for direct PM<sub>10</sub> (including road dust) are based on the unmodified estimates from the PART5 model, and as such, no discount adjustments should be applied as part of the regional emissions analysis for future conformity determinations.

For transportation plan analysis years after the last year of the maintenance plan (in this case 2017), a conformity determination must show that emissions are less than or equal to the maintenance plan's motor vehicle emissions budget(s) for the last year of the implementation plan.

Mobile sources are not significant contributors of SO<sub>2</sub>. This SIP does not establish a motor vehicle emissions budget for SO<sub>2</sub>.

#### **(a) Salt Lake County Mobile Source PM<sub>10</sub> Emissions Budgets**

In this maintenance plan, the State is establishing transportation conformity motor vehicle emission budgets (MVEB) for 2015 and 2017.

##### **(i) Direct PM<sub>10</sub> Emissions Budget**

As presented in the Technical Support Document (SMOKE Formats for Urban Counties), estimated on-road mobile source emissions for Salt Lake County, in 2015 and 2017, of direct sources of PM<sub>10</sub> (road dust, brake wear, tire wear, and exhaust particles) were 48.86 tons per winter weekday. The maintenance demonstration in Subsection IX.A.10.c.(1) estimates a maximum PM<sub>10</sub> concentration of 147.7 ug/m<sup>3</sup> in 2017 within the Salt Lake County portion of the modeling domain. This value is 2.3 ug/m<sup>3</sup> below the NAAQS of 150 ug/m<sup>3</sup>.

EPA's conformity regulation (40 CFR 93.124) also allows the implementation plan to quantify explicitly the amount by which motor vehicle emissions could be higher while still demonstrating compliance with the maintenance requirement. The implementation plan can then allocate some or all of this additional "safety margin" to the emissions budgets for transportation conformity purposes. In this case, the safety margin equates to 2.3 ug/m<sup>3</sup>.

Using the same emission projections for point and area and non-road mobile sources, the UAM-AERO model was re-run using 52.00 tons of PM<sub>10</sub> per winter weekday for mobile sources (and 35.00 tons/winter weekday of NO<sub>x</sub>). The revised maintenance demonstration for 2015 and 2017 still shows maintenance of the PM<sub>10</sub> standard. It estimates a maximum PM<sub>10</sub> concentration of 148.5 ug/m<sup>3</sup> in 2017 within the Salt Lake County portion of the modeling domain. This value is 1.5 ug/m<sup>3</sup> below the NAAQ Standard of 150 ug/m<sup>3</sup>. This maintenance plan allocates 0.8 ug/m<sup>3</sup> of the safety margin to the transportation MVEB, and thereby sets the direct PM<sub>10</sub> MVEB for 2015 and 2017 at 52.00 tons/winter weekday.

In terms of emissions, the safety margin can be described as follows: Using 52.00 tons per day of PM<sub>10</sub> and 35.00 tons per day of NO<sub>x</sub> when modeling mobile source emissions in 2015 and 2017,

the highest predicted concentration of PM<sub>10</sub> was 148.5 µg/cubic meter within the Salt Lake County portion of the modeling domain. This shows that the safety margin is at least 3.14 tons per day of PM<sub>10</sub> (52.00 tons per day minus 48.86 tons per day) and 0.04 tons per day of NO<sub>x</sub> (35.00 tons per day minus 34.96 tons per day). This maintenance plan allocates a portion of the safety margin to the mobile source budgets.

Mobile sources are not significant contributors of direct SO<sub>4</sub> exhaust particulates. This SIP does not establish a separate MVEB for SO<sub>4</sub>.

#### **(ii) NO<sub>x</sub> Emissions Budget**

NO<sub>x</sub> emissions indirectly contribute to PM<sub>10</sub> concentrations through secondary chemical reactions and for this reason are sometimes referred to as indirect or secondary PM<sub>10</sub>. As presented in the TSD (SMOKE Formats for Urban Counties), estimated on-road mobile source NO<sub>x</sub> emissions in 2015 and 2017 were 34.96 tons per winter weekday. The maintenance demonstration in Subsection IX.A.10.c(1) estimates a maximum PM<sub>10</sub> concentration of 147.7 µg/m<sup>3</sup> in 2017 within the Salt Lake County portion of the modeling domain. This value is 2.3 µg/m<sup>3</sup> below the NAAQS of 150 µg/m<sup>3</sup>.

EPA's conformity regulation (40 CFR 93.124) also allows the implementation plan to quantify explicitly the amount by which motor vehicle emissions could be higher while still demonstrating compliance with the maintenance requirement. The implementation plan can then allocate some or all of this additional "safety margin" to the emissions budgets for transportation conformity purposes. In this case, the safety margin equates to 2.3 µg/m<sup>3</sup>.

Using the same emission projections for point and area and non-road mobile sources, the UAM-AERO model was re-run using 35.00 tons of NO<sub>x</sub> per winter weekday for mobile sources (and 52.00 tons/winter weekday of PM<sub>10</sub>). The revised maintenance demonstration for 2015 and 2017 still shows maintenance of the PM<sub>10</sub> standard. It estimates a maximum PM<sub>10</sub> concentration of 148.5 µg/m<sup>3</sup> in 2017 within the Salt Lake County portion of the modeling domain. This value is 1.5 µg/m<sup>3</sup> below the NAAQS of 150 µg/m<sup>3</sup>. This maintenance plan allocates 0.8 µg/m<sup>3</sup> of the safety margin to the transportation MVEB, and thereby sets the NO<sub>x</sub> MVEB for 2015 and 2017 at 35.00 tons/winter weekday.

In terms of emissions, the safety margin can be described as follows: Using 52.00 tons per day of PM<sub>10</sub> and 35.00 tons per day of NO<sub>x</sub> when modeling mobile source emissions in 2015 and 2017, the highest predicted concentration of PM<sub>10</sub> was 148.5 µg/cubic meter within the Salt Lake County portion of the modeling domain. This shows that the safety margin is at least 3.14 tons per day of PM<sub>10</sub> (52.00 tons per day minus 48.86 tons per day) and 0.04 tons per day of NO<sub>x</sub> (35.00 tons per day minus 34.96 tons per day). This maintenance plan allocates a portion of the safety margin to the mobile source budgets.

#### **(b) Net Effect to Maintenance Demonstration**

Using the procedure described above, some of the safety margin indicated earlier in Subsection IX.A.10.c(6) has been allocated to the mobile vehicle emissions budgets. The results of this modification are presented below.

- (i) Inventory: The emissions inventory was adjusted by adding the following sums to the on road mobile source emissions totals for the entire modeling domain:

in 2015: 4.04 ton/day PM<sub>10</sub> and 0.19 ton/day NO<sub>x</sub>  
 in 2017: 5.41 ton/day PM<sub>10</sub> and 2.49 ton/day NO<sub>x</sub>

- (ii) Modeling:

The effect on the modeling results throughout the domain is summarized in the following table (which shows predicted concentrations in ug/m<sup>3</sup>). It demonstrates that with the allocation of the safety margin, the NAAQS is still maintained through 2017 in all areas.

**Table IX.A.34 Modeling of Attainment, 2005 - 2017,**

2001 Base Year Episode	2005	2008	2011	2014	2015	2017	Plus Safety Margin	
							2015	2017
Cottonwood	91.45	89.13	88.57	89.92	93.40	93.69	95.35	95.63
Hawthorne	124.17	121.71	119.76	120.84	125.60	125.97	127.95	128.32
Magna	81.33	80.32	80.11	80.52	80.44	81.91	82.24	82.54
N. Salt Lake	144.05	143.07	142.96	144.37	147.27	147.71	148.09	148.53
Ogden	113.19	113.04	113.75	116.62	121.75	122.31	133.20	133.23
Lindon	78.82	81.00	82.97	84.79	90.16	90.35	91.95	92.14
N. Provo	62.04	62.22	63.50	65.11	69.68	69.87	71.45	71.63

2002 Base Year Episode	2005	2008	2011	2014	2015	2017	Plus Safety Margin	
							2015	2017
Cottonwood	132.83	125.45	121.54	121.08	124.04	125.23	125.38	126.56
Hawthorne	136.60	127.78	122.80	122.03	125.35	126.61	126.73	127.98
Magna	93.92	94.03	95.34	96.73	96.00	98.47	96.60	99.07
N. Salt Lake	148.77	139.92	134.87	133.19	136.01	137.27	137.41	138.66
Peak Cell (near Cottonwood)	149.97	140.36	134.92	133.85	137.43	138.75	139.08	140.39
Ogden	117.70	116.09	116.02	117.59	121.20	122.12	126.60	127.51
Lindon	131.09	126.27	124.12	123.87	127.71	128.62	129.79	130.69
N. Provo	122.46	118.22	116.74	117.34	121.60	122.34	123.58	124.31

## (7) Nonattainment Requirements Applicable Pending Plan Approval

CAA 175A(c) - *Until such plan revision is approved and an area is redesignated as attainment, the requirements of CAA Part D, Plan Requirements for Nonattainment Areas, shall remain in force and effect.* The Clean Air Act requires the continued implementation of the nonattainment area control strategy unless such measures are shown to be unnecessary for maintenance or are

1 replaced with measures that achieve equivalent reductions. Utah will continue to implement the  
2 emissions limitations and measures from the PM<sub>10</sub> SIP.

3  
4  
5 **(8) Revise in Eight Years**

6  
7 CAA 175A(b) - *Eight years after redesignation, the State must submit an additional plan revision*  
8 *which shows maintenance of the applicable NAAQS for an additional 10 years.* Utah agrees to  
9 fulfill this obligation at the appropriate point in time.

10  
11  
12 **(9) Verification of Continued Maintenance**

13  
14 Implicit in the requirements outlined above is the need for the State to determine whether the area  
15 is in fact maintaining the standard it has achieved. There are two complementary ways to  
16 measure this: 1) by monitoring the ambient air for PM<sub>10</sub>, and 2) by inventorying emissions of  
17 PM<sub>10</sub> and its precursors from various sources.

18  
19 The State will continue to maintain an ambient monitoring network for PM<sub>10</sub> in accordance with  
20 40 CFR Part 58 and the Utah SIP. The State anticipates that the EPA will continue to review the  
21 ambient monitoring network for PM<sub>10</sub> each year, and any necessary modifications to the network  
22 will be implemented.

23  
24 The State will also continue to collect actual emissions inventory data from all sources of PM<sub>10</sub>,  
25 SO<sub>2</sub>, and NO<sub>x</sub> in excess of 25 tons (in aggregate) per year, as required by R307-150.

26  
27  
28 **(10) Contingency Measures**

29  
30 CAA 175A(d) - *Each maintenance plan shall contain contingency measures to assure that the*  
31 *State will promptly correct any violation of the standard which occurs after the redesignation of*  
32 *the area to attainment. Such provisions shall include a requirement that the State will implement*  
33 *all control measures which were contained in the SIP prior to redesignation.* Utah has  
34 implemented all measures contained in the plan, and will continue to do so even after  
35 redesignation. This revision need only address such contingency measures as may be necessary  
36 to mitigate any future violation of the standard.

37  
38 This Contingency Plan for Salt Lake County supercedes Subsection IX.A.8, Contingency  
39 Measures, which is part of the original PM<sub>10</sub> SIP.

40  
41 The State will rely upon ambient PM<sub>10</sub> monitoring to determine whether a violation has occurred.  
42 Upon monitoring a violation of the PM<sub>10</sub> NAAQS, the State will take the following actions.

- 43  
44     • The State will identify the source(s) of PM<sub>10</sub> causing the violation, and report the  
45     situation to EPA Region VIII within four months.  
46  
47     • The State will identify a means of corrective action within six months. The maintenance  
48     plan contingency measures to be considered and selected will be chosen from the  
49     following list or any other emission control measures deemed appropriate based on a  
50     consideration of cost-effectiveness, emission reduction potential, economic and social  
51     considerations, or other factors that the State deems appropriate:

- 1
- 2            -        Re-evaluate the thresholds at which a red or yellow burn day is triggered, as
- 3                        established in R307-302;
- 4
- 5            -        Further controls on stationary sources;
- 6
- 7    The State will require implementation of such corrective action no later than one year after the
- 8    violation was confirmed.
- 9